

The profit-investment ratio: economic growth in Spain 1994-2007

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Abstract:

This study revives the analytical capacity of the profit-investment ratio to explain economic growth in Spain between 1994 and 2007 from a post-Keynesian perspective. The analytical framework revolves around the variables that determine profit and accumulation rates. An aggregate analysis of the Spanish economy confirms a positive ratio between profit and accumulation rates. However, a disaggregate analysis (seven sectors) shows that this positive relationship is only present in the two sectors tied to the real estate bubble (construction and financial services), which also drove economic growth during this time period, and the mining-supplies sector. This outcome allows us to characterize the development model followed by the Spanish economy during this time period.

Key Words: Economic growth, investment, profit rate, accumulation rate, real estate bubble.

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Introduction

The Spanish economy experienced rapid and prolonged economic growth in 1994-2007. The Gross Domestic Product (GDP) grew at an annual rate of 3.5%, investment at 7.2%, and business profit at 4.7%. Likewise, that growth was tied to the development of a major real-estate bubble (Fernández, 2006; Campos, 2008; Bernardos, 2009), characterized by the outsized growth of the construction and financial activities sectors. This paper aims to explain the relationship between Spanish economic growth and the real-estate bubble through a set of variables that define the ratio between the profit rate (profit/capital stock) and the accumulation rate (investment/capital stock).

The premise of departure, justified in the analytical framework, is that both profit and investment are central variables involved in growth dynamics (Sawyer, 1985; Duménil and Lévy, 1993; Setterfield, 2005). Investment is an essential component of aggregate demand, while also having an impact on the supply side through capital accumulation and the growth of productivity. Profit is the principal benchmark for business forecasts, the measure upon which future investment decisions are based. If investment and profit are correlated, it is

likely that the same correlation will be reflected in the ratios of these variables to the capital stock, as asserted in seminal works by Michal Kalecki, Joan Robinson, and other authors in the post-Keynesian tradition. However, many papers about economic growth ignore the macrodynamic relationship between these variables.

This paper seeks to revive the analytical capacity of the profit-investment ratio to explain Spanish economic growth between 1994 and 2007. To do so, we propose two hypotheses. The first is that, considering that this is a period of economic growth, the profit and accumulation rates should have interacted positively to drive growth. The second is that the existence of a real-estate bubble should have been reflected in an even more positive interaction of these variables in sectors tied to the bubble—construction and finance—turning these sectors into the driving force behind Spanish economic growth.

This article is divided into five sections. The first introduces the analytical framework, describing the principal variables taken into account and their relationships with each other. The second specifies a few methodological aspects related to the empirical analysis. The third studies Spanish economic growth at the aggregate level. The fourth disaggregates the economy into seven sectors and studies their various developments. Finally, the fifth explains the conclusions drawn from the analyses.

Analytical framework

The centrality of investment in economic dynamics is the principal thesis of the Effective Demand Theory postulated by Keynes and Kalecki in the 1930s. Investment, as a component of aggregate demand, is the principal variable that determines the effective level of production (Y) and its cyclical fluctuations. Likewise, investment drives the growth of business profit (B) (Kalecki, 1935, 1954) and the accumulation of capital through increased equipment, structures, and facilities that boost the productive capacity of the economy (Robinson, 1962, 1966). As such, pursuant to the realist assumption proposed by Kalecki that economies normally function with an underutilization of capital, the growth of aggregate demand becomes the principal driver of labor productivity ($P=Y/L$) through three channels. Given that $P=Y/L=(K/L)*(Y/K)$, the rate of productivity growth (p) is equal to the difference between the growth rate of the capital-labor ratio (k) and the capital-product ratio (s). As such, $p=k - s$.

If we distinguish between capital in use (Ku) from installed capital (Ki), the capital-product ratio would be $K/Y = (Ku/Y)/(Ku/Ki)$. As such, in dynamic terms, in regard to the growth rates of $Ku/Y(v)$ and $Ku/Ki(u)$, we have $s=v - u$ and as such $p=k + u - v$.

In this way, an increase in aggregate demand, depending on its intensity and the most important component in this increase, may lead to three types of effects on labor productivity: 1) an increase of u through the scale effect, due to a higher utilization of installed capital; 2) an increase of k through the capitalization effect, causing the ratio K/L to rise; 3) the reduction of v , through the modernization effect, which consists of the incorporation of technology progress in new investments, which causes an increase in the efficiency of capital in use and therefore a reduction in the ratio K/Y .

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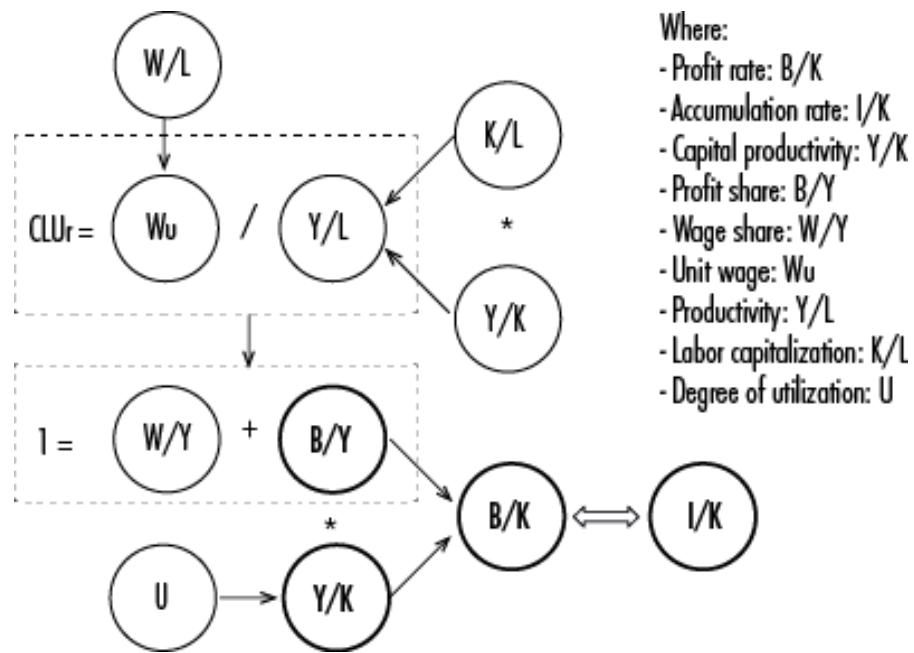


Chart 1. Decomposition of the Profit Rate

Methodology background

Data Sources and Sectoral Disaggregation

The principal source of data for this research was EUKLEMS,¹ which offers data on investment and capital stock that come, in turn, from the database maintained by BBVA Foundation and the Valencian Economic Research Institute (IVIE) (Fundación BBVA, 2006, 2009; Mas *et al.*, 2013).² This database offers data in greater detail than other sources, such as the Organization for Economic Cooperation and Development (OECD) and the European Commission Annual Macroeconomic Database (AMECO). Moreover, EUKLEMS provides other information relevant to our research and treated with the same methodology, such as Gross Domestic Product (GDP) and employment, making it a sufficiently comprehensive database for the purposes of this research. However, the database does have its limitations. First, it does not differentiate between residential and non-residential capital. Second, the sectoral data do not differentiate between financial or real-estate activities and professional services, so both sectors are studied jointly. These two limitations do not have a pertinent impact on the results obtained, but they do require more careful interpretation.

Production (Y) is measured through Gross Added Value (GAV); investment through Gross Fixed Capital Formation ($GFCF$); profit through Capital Compensation (CC); and capital through Gross Fixed Capital Stock ($GFCS$), calculated as the net capital stock plus yearly

¹ EUKLEMS: <http://www.euklems.net/euk09ii.shtml>

² Fundación

http://www.fbbva.es/TFLU/microsites/stock09/fbbva_stock08_index.html

BBVA-IVIE:

depreciation. Based on these variables, we calculated the ratios that we will use throughout this research: profit rate ($B/K = CC/GFCS$), accumulation rate ($I/K = GFCS/GFCS$), capital participation ($B/Y = CC/GAV$), and capital productivity ($Y/K = GAV/GFCS$).

The sectoral disaggregation has been organized into seven groups, as shown in Table 1. Two types of activities were excluded from the analysis due to their productive features and capital structure, which did not match the proposed theoretical framework. First, agriculture has a small and declining importance in total product (from 5.7% in 1993 to 2.9% in 2007). Second, the services provided by public administrations do not obey the logic of profit and accumulation rates.

Manufacturing activities were divided into three categories pursuant to the International Standard Industrial Classification (ISIC) published by the OECD, which divides manufacturing activities by the level of technology intensity. In this way, our three manufacturing categories are: high and medium-high technology, medium-low technology, and low technology.

Prices

Another relevant aspect of the methodology is related to prices. The data analyzed in this research were taken from the EUKLEMS database, at constant prices from 1995, using the deflators proposed by the database itself. The decision to work with constant prices was based on the evidence of high price variations among sectors of the Spanish economy during the time period in question (1994-2007). As such, using current prices would entail a significant bias, overestimating the indicators related to real-estate assets and underestimating other sectors with low or even negative inflation, such as those tied to Information and Communication Technologies (ICT).

Table 1. Sectoral Classification /EUKLEMS) and Manufacturing Branches (ISIC)

<i>Definition</i>	<i>Abbreviation</i>	<i>Code</i>
1. Construction	CONS	F
2. Mining, energy, and water supply	MESA	C+E
3. Professional, financial, real-estate, and insurance services	SPFIS	J-K
4. Other services (transportation, tourism, commerce, and social services)	OS	G-I; L-Q
5. High technology and medium-high technology manufactures	MTAMA	
5.1 Chemicals		24
5.2 Machinery and mechanical equipment		29
5.3 Transport equipment		34-35
5.4 Electronic and optical equipment		30-33
6. Medium-low technology manufactures	MTMB	
6.1 Coke, oil refining, and nuclear fuel		23
6.2 Rubber and plastic products		25
6.3 Non-metal mining products		26
6.4 Common metals and metal products		27-28

7. Low technology manufactures	MTB	
7.1 Food products, beverages, and tobacco		15-16
7.2 Textiles and footwear		17-19
7.3 Wood, cork, and straw products (except furniture)		20
7.4 Paper, editing, printing, engravings		21-22
7.5 Furniture, manufactures n.c.e., and recycling		36-36

Source: Created by the authors based on EUKLEMS and the OECD classification.

Figure 1 shows the average growth rate of the principal assets in real and nominal terms. As can be seen, when the difference between the nominal and real terms is high and positive in the majority of assets (up to a maximum of 5.8 percentage points for real-estate assets), this spread differs considerably among the various types of assets and is even negative in the case of ICT (-3.1 percentage points). As such, when we consider the effect of prices, we observe that the evolution is contrary in real terms as compared to nominal terms, meaning that (at constant prices) ICT assets grow at a higher annual average rate (10.1%), while real-estate assets grow at 3.2% annually. Consequently, "contrary to what is frequently stated, housing is not the capital that has grown the most in real terms nor, much less, has it impeded high investment growth in other productive assets, such as machinery and equipment or ICT" (Pérez García, 2009).

Source: Created by the authors. Data: Fundación BBVA-IVIE.

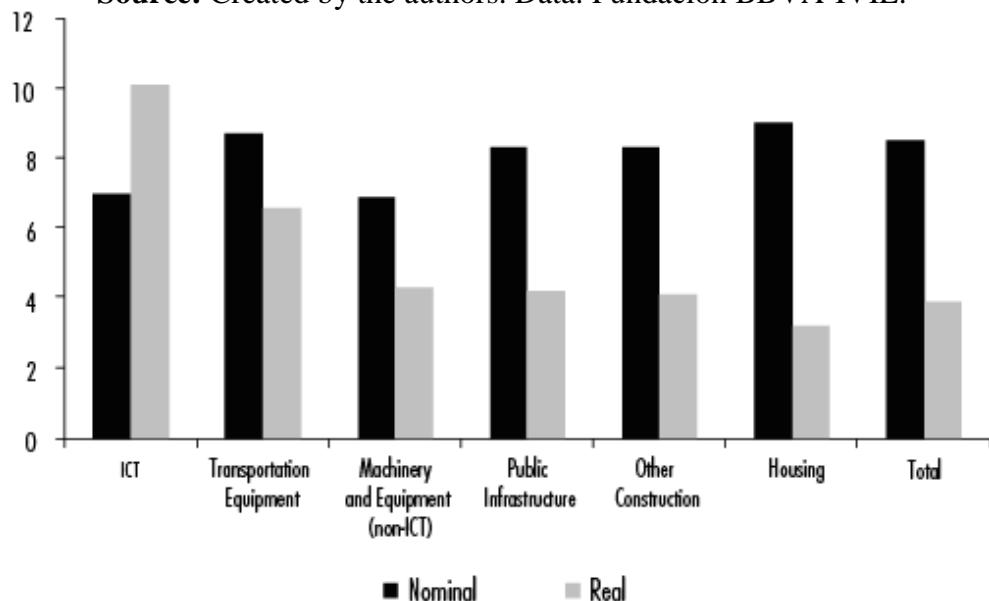


Figure 1. Average Annual Growth Variation Rates of the Net Capital Stock for Assets in the Time Period 1994-2007

The growth dynamics of the Spanish economy

Spain solidified its industrialization process in the 1960s. The country experienced rapid economic growth between 1961 and 1973, with an average annual growth rate of 7.2%, principally sustained by investment, which grew at an annual rate of 10.5%. However, this

boom was followed by a long crisis period between 1974 and 1985, when annual average growth rates fell to 1.8% and investment plummeted to -0.6% annually. This was followed by a four-year recovery period until 1990, when growth was once again slowed by the impact of the international crisis, which peaked in 1993 when production and investment contracted -1% and -8.9%, respectively. The intensity of this drop explains the strong initial drive of multiple variables, such as profit and the profit rate, at the beginning of the period studied (Alberdi, 2001; Cámara, 2003; Nieto, 2006).

Between 1994 and 2007, the Spanish economy experienced unprecedented economic growth, not so much in terms of magnitude (average annual rate of 3.4%), but rather in terms of its long duration (13 years). Gross Fixed Capital Formation (GFCF) grew at an annual rate of 7.2%, the capital stock at 4%, and profits at 4.7% annually. Investment recorded some periods of growth above 20% in 1998-1999, with a slowdown in 2000-2001 and subsequent growth from that year forward. Profits saw an initial jump, levelled off in 1996, and then grew constantly from that year forward until the end of the time period. In terms of production, Gross Added Value (GAV) maintained a growth rate of between 2% and 5% during the time period.

Looking at the principal variables in this analysis, both the profit rate (B/K) and the accumulation rate (I/K) experienced an upward trend. The profit rate grew at an annual average rate of 0.6% and the accumulation rate at 3%. This was therefore a period of intense accumulation. Despite the strong increase in profit, this accumulation moderated the rise of the profit rate. As shown in Figure 3, the relationship between B/K-I/K can be divided into three segments: first, the rapid recovery of the profit rate was crucial to drive the accumulation process. Second, in the intermediate years, the profit rate grew slowly, while the accumulation rate grew faster. Finally, the revival of the profit rate starting in 2000 translated into a new push for the accumulation rate.

The relationship between I/K and B/K displays a significant linear correlation (see Figure 4b). Although this is a simple statistical exercise from which causal relationships should not be derived, it does offer an interesting initial approach to the behavior of these two variables. The correlation is nearly perfect between the evolution of the accumulation rate (I/K) and production (Y) (correlation coefficient 0.95), pursuant to the key role investment plays in accumulation and growth dynamics. The correlation between the profit and accumulation rates is also high between 1997 and 2007 (0.72), in other words, when the first three years, as profits spiked due to the change in cycle, are eliminated from the sample. Although these results are interesting, further research is needed to empirically test this theoretical perspective.

Source: Created by the authors. Data: EUKLEMS.

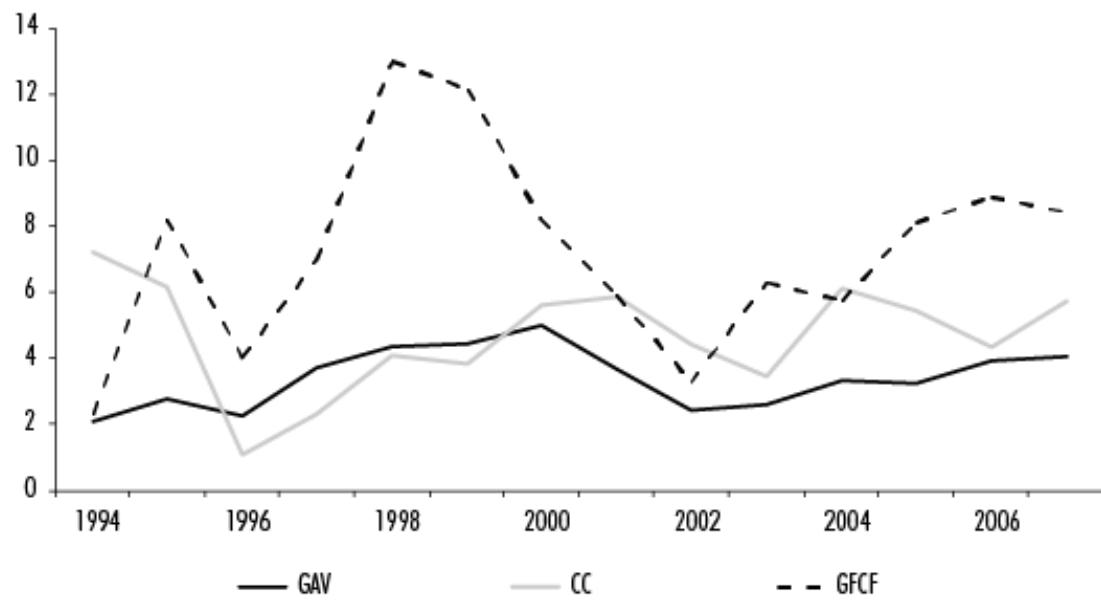


Figure 2. Growth of GAV, GFDCF, and Company Profit (CC), Annual Variation Rates at Constant Prices from 1995

Source: Created by the authors. Data: EUKLEMS.

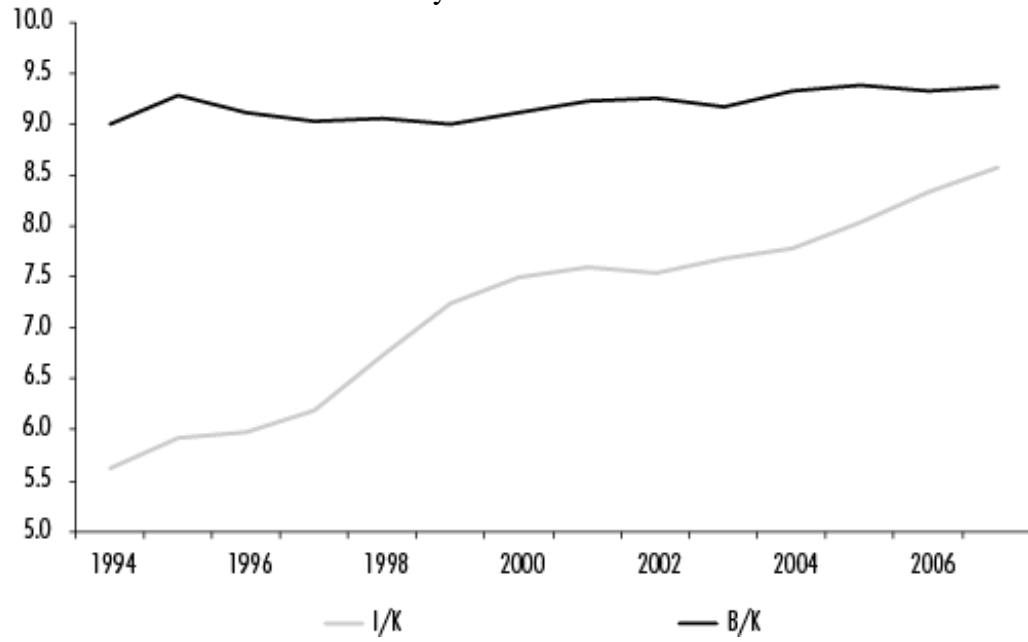


Figure 3. Profit Rate and Accumulation Rate, Expressed in Percentages

Source: Created by the authors. Data: EUKLEMS.

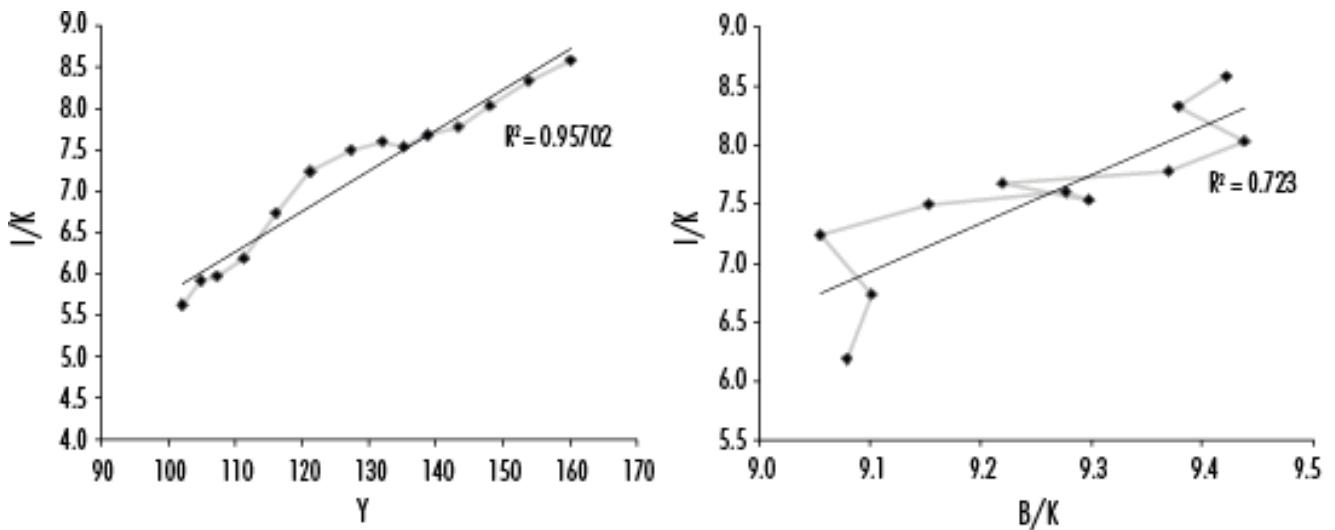


Figure 4. Linear Regression of the Variables: a) Accumulation Rate (y-axis) and Gross Added Value (Index 1993=100, x-axis); 1993-2007. b) Profit Rate (x-axis) and Accumulation Rate (y-axis), 1997-2007.

At the second level of analysis, decomposing the profit rate into profit share (B/Y) and capital productivity (Y/K), we observe that both remained stable in the first half of the period, but experienced negative trends starting in 2000: B/Y grew while Y/K fell. The result for the entire period was that B/K grew at an annual average rate of 0.6% due to the fact that growth of B/Y (1.2%) was higher than the fall of Y/K (-0.6%). As such, the intense accumulation process caused a notable drop in the productivity of capital, which is the reason why the profit rate could rise only through a distribution of income increasingly favorable to profit (and therefore detrimental to the wage share).

At the third level of analysis, we studied the causes behind the evolution of the profit share (B/Y). Seen through the wage share (W/Y), it appears that it fell at an annual average rate of -0.7%. This drop took place in a context of strong job creation at an average annual rate of 3.1% measured in hours worked,³ while total wages grew 2.4% annually. At the same time, the unit salary fell at an annual rate of 0.7%. Because labor productivity grew slowly (0.4% annually), the considerable decrease in the unit wage made possible a constant drop in unit labor costs (unit wage/productivity). Thus, the major drop in the unit wage was a decisive factor in the rising profit share (decrease of salary share) and the consequent increase in the profit rate.

In conclusion, the results of this analysis would seem to confirm the first hypothesis regarding the link between profit and accumulation rates as the principal motors of Spanish economic growth in the time period 1994-2007. Therefore, the growth dynamics were based on:

- 1) Strong accumulation of production factors, labor, and capital, to the detriment of their respective productivities.
- 2) Distribution of income increasingly favorable to capital (profit) due to the contraction of the unit wage in light of productivity stagnation.

³ Employment measured in number of jobs grew at an annual rate of 3.6%. As a result, there was a drop in the number of hours worked per employee (-0.5%) as a consequence of the rapid increase in temporary and part-time hiring.

- 3) Strong interaction between the high growth of the accumulation rate and the moderate increase in the profit rate. Likewise, the increase in the profit rate was based on the rising profit share to compensate for falling capital productivity.
- 4) The decisive nature of the interaction between the accumulation rate and the evolution of production.

Table 2. Evolution of the Principal Variables at the Aggregate Level During the Time Period 1994-2007. Average Annual Growth Rates

Gross Added Value (Y)	3.4	Accumulation Rate (I/K)	3.0
Capital Stock (K)	4.0	Profit Rate (B/K)	0.6
Employment (L)	3.1	Profit Share (B/Y)	1.2
Investment (I)	7.2	Unit Wage (W/L)	-0.7
Profit (B)	4.7	Labor Productivity (Y/L)	0.4
Total Wages (W)	2.7	Capital Productivity (Y/K)	-0.6

Source: Created by the authors. Data: EUKLEMS.

Sectoral economic dynamics

As mentioned in the Methodology section, the sectoral analysis divided the economy into seven sectors: 1) construction (CONS); 2) mining, energy, and water supply (MESA); 3) professional and financial services, real estate, and insurance (SPFIS); 4) other services (including tourism, transportation, commerce, and social services, among others) (OS); 5) high and medium-high technology manufactures (MTAMA); 6) medium-low technology manufactures (MTMB); and 7) low technology manufactures (MTB).

Table 3 summarizes the profit and accumulation rates for the seven sectors. As can be seen, CONS, SPFIS, and MESA display results similar to those of the overall economy, but with higher growth rates. The other sectors, however, present results rather different from the overall economy, and heterogeneous among each other.

Pursuant to these results, we will analyze these two sets of sectors separately, following the same three-level method used for the aggregate analysis.

Table 3. Evolution of Profit and Accumulation Rates and their Components by Sector, 1994-2007. Average Growth Rates at Constant Prices from 1995

	B/K	I/K	B/Y	Y/K	K/L	Y/L
Economy	0.6	3.0	1.2	-0.6	1.0	0.4
Construction	1.1	5.2	2.4	-1.3	0.1	-1.1
Professional and financial services	1.6	4.1	0.6	1	-1.0	0.0
Mining, energy, supply	1.5	5.1	1.3	0.2	4.2	4.4
High and med-high	3.4	-0.2	3.1	0.3	2.3	2.7

tech manufactures						
Med-low tech manufactures	2.7	1.9	1.2	1.5	-0.3	1.2
Low tech manufactures	-2.7	1.1	0.6	-3.3	3.6	0.1
Other services	-0.8	1.7	1.6	-2.3	2.7	0.3

Source: Created by the authors. Data: EUKLEMS.

Construction and Professional and Financial Services

The principal indicators point to CONS and SPFIS as the most standout sectors during the period in question. Table 4 reveals that the highest growth rates were recorded in these sectors in terms of production, investment (also MESA), profit, and capital stock. In this way, the share of CONS and SPFIS rose in total profit, jointly reaching 40% of the total. They also account for a significant share of added value of the economy, reaching 30% of the total. The increase in GAV (4.3 percentage points) is doubled when considered in nominal terms (9.1 percentage points), which denotes a significant increase in prices in sectors tied to the financial and real-estate bubble (see Figure 2).

The relevance of these two sectors is not limited to their intense growth. At the same time, they are the sectors that show: 1) the same link between profit rate and accumulation rate as the economy as a whole, 2) faster growth in these same rates than the overall economy, and 3) behavior clearly differentiated from the rest of the sectors.

Figure 5 displays a high linear correlation between the evolution of the profit and accumulation rates for the CONS and SPFIS sectors, with correlation coefficients of 0.84 and 0.88, respectively. In the construction sector, the first three years have been excluded for the same reasons mentioned in the aggregate analysis.

Therefore, looking at these factors, it is evident that the CONS and SPFIS⁴ sectors played a starring role in the evolution of the Spanish economy as a whole. There seems to be a causal relationship between the results obtained in these two sectors and aggregate economic behavior, although further research would be needed to verify this hypothesis.

The profit rate was higher for SPFIS than CONS. Slow growth in the CONS profit rate is due to the fact that its value is higher in absolute terms (30%). In SPFIS, we observe an apparent paradox whereby the value of its profit rate is lower (about 5% as compared to 9% for the economy as a whole). This is due in large part to the vast amount of capital stock it concentrates (principally the real estate branch with residential assets). This lower value of the profit rate permits high growth rates for the same.

⁴ The case of MESA is similar, although with lower growth in production and the relationship between B/K - I/K is weaker than in these two sectors. It is also relevant to note that although the participation of this sector in total GAV was 3% in 2007, its share in total profit was nearly double due to the importance of big electrical companies.

Table 4. Growth of the Principal Variables by Sector, 1994-2008. Average Annual Growth Rate at Constant Prices from 1995

	<i>B</i>	<i>I</i>	<i>Y</i>	<i>K</i>	<i>L</i>	<i>Wu</i>	<i>W</i>
Economy	4.7	7.2	3.4	4.0	3.1	-0.4	2.7
Construction	7.5	11.9	5.0	6.4	6.2	-2.2	4.0
Professional and financial services	5.0	7.7	4.4	3.4	4.4	-0.8	3.6
Mining, energy, supply	4.5	8.2	3.2	3.0	-1.1	1.3	0.2
High and med-high tech manufactures	7.1	3.3	3.9	3.6	1.2	1.4	2.6
Med-low tech manufactures	4.8	3.9	3.5	2	2.3	0.5	2.8
Low tech manufactures	0.7	4.6	0.1	3.5	0.0	-0.4	-0.4
Other services	4.9	7.6	3.3	5.8	3.0	-0.3	2.7

Source: Created by the authors. Data: EUKLEMS.

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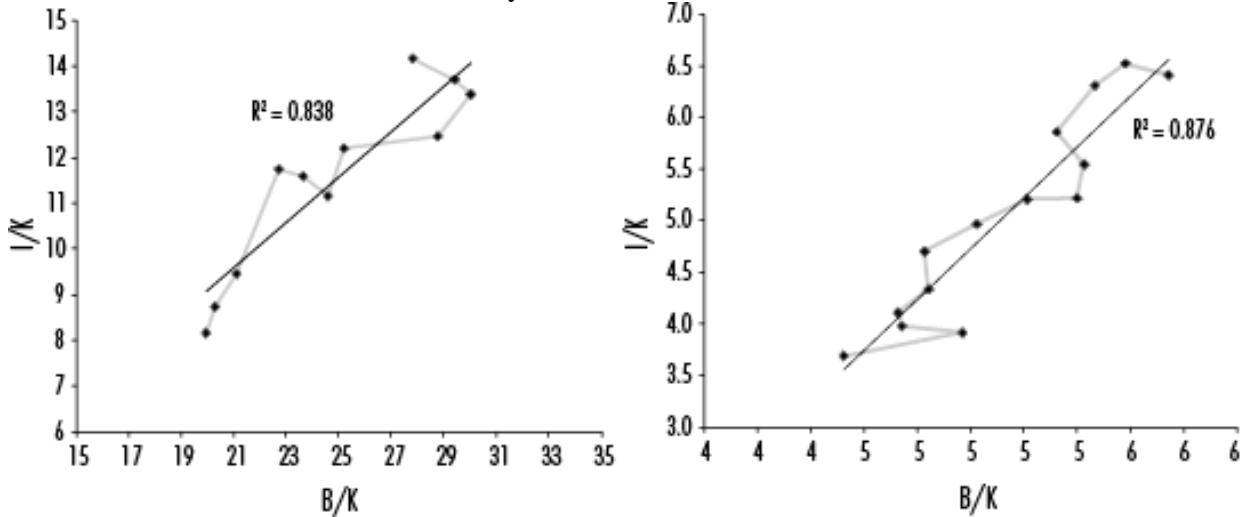


Figure 5. Linear Regression of the Accumulation and Profit Rates for the Construction and Professional and Financial Services Sectors

At the second level of analysis, we considered the evolution of the two components of the profit rate: B/Y and Y/K . Table 4 displays that the share of benefits rose in all sectors, but at varying magnitudes. At the same time, capital productivity recorded positive growth in SPFIS and negative in CONS. Consequently, the rise in the share of profit has been the

driving factor behind the increased profit rate, being higher than the drop in productivity capital in CONS, while in SPFIS, the share of benefits contributed to raising the benefit rate, with the rise in capital productivity being, in this case, the principal explanatory factor for the evolution of its profit rate.

At the third level of analysis, we found the explanation for the behavior of these variables in the two sectors. The unit labor cost shows that both sectors evolved similarly, characterized by four features: 1) considerable increase in total wages (annual average of 4% for CONS and 3.6% for SPFIS); 2) strong job creation (6.2% and 4.4%, respectively); 3) drop in the unit wage (-2.2% and -0.8%); and 4) deficient evolution of labor productivity (-1.1% and 0%). As such, the increase in the profit rate was due to the notable decrease in the unit wage in both sectors, albeit at varying magnitudes. This caused a faster increase in the profit share in construction (2.4% annually) than in financial and professional services (0.6%).

As such, the disparate speed in the increase of the profit rate was due both to the difference in the evolution of the share of profit and the opposite behavior of capital productivity. As mentioned, labor productivity fell in CONS and stagnated in SPFIS, while capital productivity fell in CONS, but rose in SPFIS. In this way, the fall in labor productivity was more intense than the moderate increase of labor capitalization (K/L) in CONS, while in SPFIS, the stagnation of labor productivity was accompanied by a decrease in K/L (see Table 4).

The results for the MESA sector were clearly distinct. The profit rate grew thanks to the rising profit share, with capital productivity remaining constant. The increase in B/Y was brought about by a major increase in labor productivity (4.4% annually) with a lesser increase in the unit wage (1.3%), because total wages grew slightly with a higher decrease in employment (-1.1%; see Table 4).

In conclusion, pursuant to the second hypothesis, the construction and finance sectors have been characterized by higher and rising profit and accumulation rates, turning them into the motors of the Spanish economy during this time period. Their growing profit rate was possible thanks to the increased share of profit (and also the rise in capital productivity in the case of SPFIS). Likewise, the growth of the profit rate expresses the contraction of unit labor costs (CLU) due to the fact that unit wages fell more than labor productivity (stagnation in the case of SPFIS). Below we will see how the behavior of the rest of the sectors differs from the behavior of CONS and SPFIS and the evolution of the Spanish economy as a whole.

Manufactures and the Rest of Services

There are no major differences in the magnitude of the growth of production, as all of the manufacturing sectors (except those related to low technology) and services other than financial and professional services recorded annual growth rates of around 3%. In any case, the heterogeneity of the OS sector, which includes tourism, transportation, and other services, and accounted for 45% of the GAV and 35% of total profit in 2007, must be noted.

At the first level of analysis, (profit and accumulation rates), we identified two types of situations, both of which are different from the overall economy. First, MTAMA and MTMB displayed higher profit rate growth than the overall economy (and also CONS and SPFIS), although the accumulation rate rose only moderately in MTMB and fell in MTAMA. Second, MTB and OS experienced declining profit rates and growing accumulation rates. For this

reason, the linear correlations between the two variables are negative and weak in these sectors.

At the second level, decomposing the profit rate, we identified the same differences between these groups. First, the declining profit rate in OS and MTB was due to the combination of a strong drop in capital productivity and a weak increase in the share of profits. Second, the rising profit rates in MTAMA and MTMB were due to the positive evolution of its two components: notable growth in the profit share and a moderate increase in capital productivity (see Table 4).

At the third level, disaggregating the profit share, we also see rather disparate behavior. On the one hand, unit labor costs for the MTB and OS sectors fell due to the declining unit wage and the slight increase in labor productivity. On the other, in MTAMA, the decrease in unit labor costs was more intense because despite the fact that unit wages rose, labor productivity grew at a faster pace.

In this way, analysis of these sectors permits us to draw four conclusions:

- 1) The divergent evolution of the two principal variables with respect to two sectors that were motors of the economy: construction (CONS) and professional and financial services (SPFIS).
- 2) The four sectors can be divided into two groups: medium-low technology manufactures (TMB) and high and medium-high technology manufactures (MTAMA), on the one hand, and low technology manufactures (TB) and other services (OS), on the other.
- 3) The second group includes the only sectors (MTB and OS) that displayed a declining profit rate due to the negative evolution of capital productivity, which was sharper than the upward trend of the profit share.
- 4) Medium-low and high and medium-high technology manufactures experienced a positive trend for the profit rate due to the positive evolution of both the profit share and capital productivity. Besides MESA, these were the only sectors whose unit wages grew, so the decrease in unit labor costs was due to a higher increase in labor productivity.

Conclusions

First, this analysis allows us to confirm that economic growth in Spain in 1994-2007 was characterized by intense accumulation of factors (capital and labor) to the detriment of their respective productivities.

Second, the positive evolution of the profit rate was possible thanks to falling unit wages, which caused a decrease in unit labor costs, and therefore an increase in the share of profit out of total revenue. This rising profit share compensated the decrease in capital productivity, which reflects the low technical efficiency of the new installed capital, concentrated primarily in construction and services, both sectors with low productivities.

As such, the distribution of income favorable to profits has been the fundamental factor that permitted the profit rate to grow, driven therefore by the accumulation process. In this way, the profit and accumulation rates interacted positively, spurring the intense economic growth seen in the Spanish economy during this time period.

Third, the sectoral analysis confirms the importance of the real-estate bubble in the dynamics of Spanish growth. The two sectors tied to the bubble (construction and finance) were precisely those that showed the highest growth in terms of production, profit, and investment. Moreover, they display a strong correlation between the profit and accumulation rates, while that correlation was rather weaker in other sectors. As such, construction and finance became the motors of the Spanish economy. The third relevant sector, mining-energy-supplies, together with medium-low, medium-high, and high technology manufactures, were the only sectors that experienced a significant increase in productivity, permitting an increase in the unit wage and at the same time an increase in the profit share.

Fourth, there seems to be a tradeoff between employment and productivity. On the one hand, the predominant sectors (construction and finance) are labor-intensive. Productivity in these sectors fell (construction) or stagnated (finance), and the same happened with the unit wage. On the other hand, productivity grew in high and medium-high technology manufactures and in the mining-energy-supply sector, where employment stagnated or declined while the unit wage rose.

By way of summary, Table 5 confirms the importance of the real-estate bubble, taking the construction sector as the paradigmatic example. This table shows the annual average growth rates of the principal variables studied and their relationship with each other in a dynamic setting. It can be seen that the relationship between variables is the same in the construction sector as in the overall economy, but with a greater magnitude in the former case, which might lead us to think, pursuant to the analysis presented above, that this sector, together with the financial and professional services sector, was the motor of the Spanish economy in the time period 1994-2007.

Table 5. Principal Variables and their Relationship with each Other for the Overall Economy and the Construction Sector. Average Annual Growth Rates, 1994-2007.

<i>Variation rates for:</i>	<i>Economy</i>	<i>Construction</i>
Gross Added Value = labor productivity + employment	3.4 = 0.4 + 3.1	5.0 = -1.1 + 6.2
Labor productivity = labor capitalization + capital productivity	0.4 = 1.0 + (-0.6)	-1.1 = 0.1 + (-1.3)
Unit wage cost = unit wage – productivity	-0.7 = -0.4 - (0.4)	-2.1 = -2.2 - (-0.1)
Profit rate = profit share + capital productivity	0.6 = 1.2 + (-0.6)	1.1 = 2.4 + (-1.3)
Gross Added Value = capital productivity + capital stock	3.4 = -0.6 + 4.0	5.0 = -1.3 + 6.4

Source: Created by the authors. Data: EUKLEMS.

Finally, we understand that this paper has produced some interesting results to explain Spanish economic growth. However, this is just a general approach, so it will be necessary to conduct further and more in-depth theoretical and quantitative analyses to examine the aspects explored here. Likewise, this is a study with a partial scope. For this reason, adding more variables would contribute to explaining growth and the Spanish economic crisis with a broader scope. This is true of the variables related to the institutional framework and financial system, those related to the phenomena of income and consumption tied to the wealth effect caused by the financial bubble, and those linked to Spanish growth in the

context of European economies and the global scale. It will also be necessary for future studies to find reliable data that distinguishes between residential and non-residential capital, separates professional from financial services, and offers more specific disaggregation of the various economic sectors.

Appendix 1A. Growth of the Profit Rate (B/K) and the Accumulation Rate: Annual Rates (%)

		1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	Average 1994-2007
nomy	B/K	4.5	3.1	-1.9	-0.9	0.2	-0.5	1.1	1.4	0.2	-0.8	1.6	0.7	-0.6	0.5	0.6
	I/K	-0.3	5.1	1.0	3.6	8.8	7.5	3.6	1.4	-0.9	1.9	1.3	3.3	3.7	3.1	3.0
nstruction	B/K	8.0	6.7	-	-	1.8	4.0	7.6	4.1	4.0	2.5	14.2	4.3	-2.1	-5.4	1.1
	I/K	4.8	10.1	5.2	-3.1	7.0	8.3	24.3	-1.3	-3.7	9.4	2.2	7.3	2.4	3.4	5.2
nning, Energy, and Water Supply	B/K	-0.2	2.2	6.1	1.5	1.0	3.8	5.0	4.8	2.4	1.1	2.5	-0.1	-7.2	-1.7	1.5
	I/K	5.3	1.2	4.1	6.8	3.6	3.2	-0.4	2.2	11.6	-4.8	18.8	10.7	8.5	2.4	5.1
Professional Financial Services	B/K	-1.8	9.9	-4.6	-0.3	2.5	-0.3	4.0	3.8	3.6	0.5	-1.9	2.7	2.1	2.9	1.6
	I/K	1.3	6.0	1.7	3.2	5.6	8.4	5.7	4.9	0.2	6.3	5.6	7.7	3.4	-1.7	4.1
Commerce, Hospitality, Transportation, and social services	B/K	6.0	-7.7	-3.1	0.1	0.8	1.9	-1.9	-1.5	-2.7	-2.4	2.6	1.9	-2.5	-2.4	-0.8
	I/K	1.3	0.5	-3.9	2.3	10.2	5.4	9.4	-2.3	-1.6	-1.0	-3.7	0.1	2.4	6.2	1.7
High and medium-high technology manufactures	B/K	34.2	33.0	6.4	-2.6	-3.9	-7.4	-6.4	0.4	-2.1	0.7	-3.3	-5.0	10.1	3.9	3.4
	I/K	-9.2	12.4	8.0	10.7	7.3	5.6	-	6.6	-	-2.6	-5.9	-	6.7	4.9	-0.2
Medium-low technology manufactures	B/K	17.6	19.0	-9.8	5.1	-2.6	-1.7	7.8	1.2	1.5	-1.4	-2.4	3.2	4.5	-0.4	2.7
	I/K	-	21.6	6.2	0.4	11.6	12.4	-9.9	1.1	-6.4	-0.2	-0.4	7.4	-0.4	7.1	1.9
Low technology manufactures	B/K	-3.8	0.1	-5.6	-4.0	-3.3	-3.5	-0.8	-2.5	-0.8	-2.3	-7.8	-1.8	-8.0	7.0	-2.7
	I/K	-	13.0	2.9	4.5	12.3	7.1	-	-1.6	-0.7	-4.1	5.8	-5.2	19.1	5.4	1.1

Source: Created by the authors. Data: EUKLEMS.

Appendix 1B. Growth of the Components of the Profit Rate: Share of Profit in Income (B/Y) and Capital Productivity (Y/K): Annual Rates (%)

		1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	Average 1994-2007
nomy	B/Y	5.0	3.3	-1.1	-1.4	-0.2	-0.6	0.6	2.1	1.9	0.8	2.7	2.1	0.4	1.6	1.2
	Y/K	-0.5	-0.2	-0.7	0.5	0.5	0.1	0.5	-0.7	-1.7	-1.6	-1.0	-1.3	-1.0	-1.1	-0.6

Instruction	B/Y	8.9	4.4	-13.8	-11.2	0.1	1.4	9.5	3.5	4.5	5.2	16.7	7.2	1.3	-0.3	2.4
	Y/K	-0.8	2.2	-5.3	-0.3	1.7	2.6	-1.7	0.6	-0.4	-2.6	-2.2	-2.7	-3.3	-5.1	-1.3
Mining, Energy, and Water Supply	B/Y	0.8	0.6	1.9	0.1	1.7	1.5	1.1	2.2	2.0	-0.2	1.9	0.9	-0.7	3.7	1.3
	Y/K	-1.1	1.6	4.2	1.3	-0.8	2.2	3.8	2.5	0.3	1.3	0.6	-1.0	-6.5	-5.2	0.2
Professional and Financial Services	B/Y	2.1	3.2	-2.7	-1.2	-0.3	-0.8	0.4	2.0	3.1	1.1	-2.3	1.6	0.3	1.9	0.6
	Y/K	-3.8	6.5	-1.9	0.9	2.8	0.5	3.6	1.7	0.4	-0.6	0.5	1.1	1.8	1.0	1.0
Commerce, hospitality, transportation, and social services	B/Y	7.3	-3.2	-0.5	1.5	2.4	2.9	0.5	2.2	1.3	0.7	4.6	3.6	-0.3	-0.3	1.6
	Y/K	-1.2	-4.6	-2.6	-1.4	-1.5	-0.9	-2.3	-3.6	-3.9	-3.1	-1.9	-1.6	-2.1	-2.1	-2.3
High and medium-high technology manufactures	B/Y	22.9	22.8	4.9	-2.5	-1.5	-2.7	-4.1	0.7	3.4	1.8	-3.1	-3.3	6.8	1.9	3.1
	Y/K	9.2	8.3	1.5	-0.1	-2.4	-4.9	-2.4	-0.3	-5.3	-1.1	-0.2	-1.7	3.1	1.9	0.3
Medium-low technology manufactures	B/Y	9.7	11.3	-6.8	0.7	-3.7	-3.4	4.5	-1.5	1.7	-0.5	-1.9	3.7	4.5	0.6	1.2
	Y/K	7.2	6.9	-3.3	4.4	1.2	1.8	3.2	2.7	-0.2	-0.9	-0.5	-0.5	0.0	-1.0	1.5
Low technology manufactures	B/Y	2.5	3.8	-1.7	-4.0	-1.4	0.1	2.2	0.1	1.5	0.2	-2.6	1.2	-2.8	10.5	0.6
	Y/K	-6.1	-3.6	-4.0	0.0	-2.0	-3.6	-3.0	-2.6	-2.3	-2.5	-5.3	-2.9	-5.3	-3.2	-3.3

Source: Created by the authors. Data: EUKLEMS.

Appendix 2A. Values of the Profit Rate and the Accumulation Rate (Expressed in Percentage)

		1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Economy	B/K	9.0	9.3	9.1	9.0	9.1	9.0	9.1	9.2	9.2	9.2	9.3	9.4	9.3	9.4
	I/K	5.6	5.9	6	6.2	6.7	7.3	7.5	7.6	7.5	7.7	7.8	8.0	8.3	8.5
Construction	B/K	25.9	27.6	22.5	19.9	20.3	21.1	22.7	23.6	24.6	25.2	28.8	30.0	29.4	27.8
	I/K	7.3	8.0	8.4	8.2	8.7	9.4	11.7	11.6	11.2	12.2	12.5	13.4	13.7	14.2
Mining, Energy, and Water Supply	B/K	13.0	13.2	14.1	14.3	14.4	14.9	15.7	16.4	16.8	17.0	17.4	17.4	16.2	15.9
	I/K	5.7	5.7	6.0	6.4	6.6	6.8	6.8	6.9	7.7	7.4	8.8	9.7	10.5	10.8
Professional and Financial Services	B/K	4.5	5.0	4.7	4.7	4.8	4.8	5.0	5.2	5.4	5.4	5.3	5.5	5.6	5.7
	I/K	3.7	3.9	4.0	4.1	4.3	4.7	5.0	5.2	5.2	5.5	5.9	6.3	6.5	6.4
Commerce, hospitality, transportation, and social services	B/K	11.8	10.9	10.5	10.5	10.6	10.8	10.6	10.5	10.2	9.9	10.2	10.4	10.1	9.9

	I/K	8.8	8.8	8.5	8.6	9.5	10.0	11.0	10.7	10.6	10.5	10.1	10.1	10.3	11.0
High and medium-high technology manufactures	B/K	16.1	21.4	22.8	22.2	21.3	19.7	18.5	18.6	18.2	18.3	17.7	16.8	18.5	19.2
	I/K	8.9	10.0	10.8	11.9	12.8	13.5	10.9	11.6	10.3	10.1	9.5	8.5	9.0	9.5
Medium-low technology manufactures	B/K	12.4	14.7	13.3	13.9	13.6	13.4	14.4	14.6	14.8	14.6	14.2	14.7	15.3	15.3
	I/K	5.6	6.8	7.2	7.3	8.1	9.1	8.2	8.3	7.8	7.8	7.7	8.3	8.3	8.9
Low technology manufactures	B/K	16.9	16.9	15.9	15.3	14.8	14.3	14.2	13.8	13.7	13.4	12.3	12.1	11.1	11.9
	I/K	7.7	8.7	8.9	9.3	10.5	11.2	8.8	8.6	8.6	8.2	8.7	8.2	9.8	10.4

Source: Created by the authors. Data: EUKLEMS.

Appendix 2B. Values of the Share of Profit in Income and Capital Productivity (In Percentages)

		1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Economy	B/Y	35.5	36.7	36.2	35.7	35.7	35.4	35.6	36.4	37.1	37.4	38.4	39.2	39.3	40.0
	Y/K	25.4	25.3	25.1	25.3	25.4	25.4	25.5	25.4	24.9	24.5	24.3	24.0	23.7	23.4
Construction	B/Y	27.4	28.6	24.7	21.9	21.9	22.2	24.3	25.2	26.3	27.7	32.3	34.6	35.1	34.9
	Y/K	94.4	96.5	91.3	91.1	92.6	95.0	93.3	93.9	93.5	91.0	89.1	86.7	83.9	79.6
Mining, Energy, and Water Supply	B/Y	64.7	65.1	66.3	66.4	67.6	68.6	69.4	70.9	72.3	72.2	73.6	74.3	73.7	76.5
	Y/K	20.0	20.3	21.2	21.5	21.3	21.8	22.6	23.2	23.3	23.6	23.7	23.5	21.9	20.8
Professional and Financial Services	B/Y	55.0	56.8	55.2	54.6	54.4	54.0	54.2	55.3	57.1	57.7	56.3	57.2	57.4	58.5
	Y/K	8.2	8.8	8.6	8.7	8.9	8.9	9.3	9.4	9.5	9.4	9.5	9.6	9.7	9.8
Commerce, hospitality, transportation, and social services	B/Y	26.6	25.7	25.6	26.0	26.6	27.3	27.5	28.1	28.4	28.6	30.0	31.0	30.9	30.8
	Y/K	44.3	42.3	41.2	40.6	40.0	39.6	38.7	37.3	35.8	34.7	34.1	33.5	32.8	32.1
High and medium-high technology manufactures	B/Y	28.6	35.1	36.8	35.9	35.4	34.4	33.0	33.2	34.4	35.0	33.9	32.8	35.0	35.7
	Y/K	56.3	61.0	61.9	61.8	60.3	57.4	56.0	55.8	52.8	52.3	52.2	51.3	52.9	53.9
Medium-low technology manufactures	B/Y	37.3	41.5	38.7	39.0	37.5	36.2	37.8	37.3	37.9	37.7	37.0	38.4	40.1	40.4
	Y/K	33.2	35.5	34.3	35.8	36.2	36.9	38.0	39.1	39.0	38.7	38.5	38.3	38.3	37.9
Low technology manufactures	B/Y	43.7	45.3	44.6	42.8	42.2	42.2	43.1	43.2	43.8	43.9	42.7	43.2	42.0	46.4
	Y/K	38.6	37.3	35.8	35.8	35.1	33.8	32.8	32.0	31.3	30.5	28.9	28.0	26.5	25.7

Source: Created by the authors. Data: EUKLEMS.

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