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Brands and Economic Growth: The Spanish Case

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ABSTRACT

The aim of this paper is quantifying the contribution of intangible forms of capital accumulation, particularly brands, to economic growth. Thus, we account for expenditures in advertising and product design and distribution in the Spanish economy. We group the Spanish economy into 32 economic sectors from 1970 to 2011 and divide them according to labor intensive and capital intensive sectors. Then we develop a chain model that accounts for different forms of capital accumulation, like machinery, infrastructures and ICT investment. We find that regardless of capital intensity and different forms of capital accumulation, investment in advertising is more broadly adopted and thus must have a higher payoff than investment in product design and distribution.

Keywords: intangible capital, brands, advertising

JEL classification: M37

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1. **Introduction**

Brand management has traditionally played a central role in companies' management, particularly in the marketing area. Brands identify goods and services and summarize useful information for markets, such as good and service information, benefits, users, quality, etc. (Keller 1993, 2001; Aaker 1991). Brands affect companies' sales and therefore influence their profitability. They provide firms with extra cash flows with regard to companies that do not employ branded goods or services (Shocker and Weitz 1988; Shankar et al. 2008). Brands also create a defensible position over competitors via company differentiation (Porter, 1985). Consequently, investments in brand development improve firm results (Keller, 1993; Kerin & Sethuraman, 1998; Ambler, 2003; Oliveira-Castro et al., 2008): the greater the value of brands of a company, the greater its competitive differentiation advantages (Aaker,1991; Nurittamont and Ussahawanitchakit, 2008, Kim and Kim, 2005; Lassar, Mittal, and Sharma, 1995), hence the better the results it achieves (Aaker, 1991, 1996; Keller, 1993; Park and Srinivasan, 1994; Nurittamont and Ussahawanitchakit, 2008; Oliveira-Castro et al., 2008) and the higher its market value (Simon and Sullivan, 1993; Kerin and Sethuraman, 1998).

At a country level, the investments in brands creation and development are also beneficial. In the words of Baruch Lev, 'Wealth and growth in today's economy are driven primarily by intangible assets' (Lev, 2001). They influence economic growth (Corrado, Hulten and Sichel, 2005) and protect national economies versus cyclical fluctuations and from other economies with more favorable cost structures. However, countries do not always efficiently create and grow their brands due to structural problems in terms of resource allocation and mismanagement of these assets. Consequently, some governments encourage an adequate management of these intangible assets among their national companies. Still, there is a potential need of developing policies at the sector level.

Quantifying how resources addressed to brands contribute to economic growth is the first step to develop effective policies for encouraging an adequate management of these intangible assets. Unfortunately, Lev (2001) underlines the lack of information on intangibles. Some quantification at the country level has been performed since for some countries (Corrado, Hulten and Sichel, 2009; Fukao et al. 2009; Giorgio Marrano, Haskel and Wallis, 2009; van Ark et al. 2009). But, up to the extent of our knowledge, it has never been done at the mesoeconomic or sector level.

In this manuscript, we develop a chain model that allows quantifying how intangible forms of capital accumulation contribute to economic growth at a sector level. It is an adequate tool to account for sector level differences in the contribution of capital accumulation and intangible assets to economic growth. It identifies how branding expenditures affect production and thus provide valuable information to policy makers, who can design effective policies based on our chain model. We present an application of our methodology to the Spanish economy, segmented into 32 economic sectors from 1970 to 2011. Our results indicate that regardless of capital intensity and different forms of capital accumulation, companies in Spain manage their brands focusing on the internal market, not focusing on taking advantage of foreign markets fully.

The remainder of this manuscript is structured as follows: In the next section we review how previous literature measures the contribution of factors of production to economic growth. Next we present our methodology and the database we use in our research, followed by our empirical application to the Spanish case. Finally, we analyze the results and present our conclusions.

2. **Approximation to models of intangible capital**

Traditionally, labor and capital have been the factors of production. These are two forms of capital: human capital and physical capital. Their relative contribution to the aggregate production function in an economy is approximately two thirds and

one third respectively (Mankiw, Romer and Weil, 1992). Cobb-Douglass encapsulated this in a functional form as early as 1928:

$$Q = AK^{\alpha}L^{\beta} \qquad (1)$$

where Q stands for total quantity produced in real terms, K stands for physical capital, L for human capital, and α and β represent their relative proportional contributions of these two factors (Cobb and Douglass, 1928). A is a multiplier that was denominated the Solow residual after Solow, who noticed that it could contain any other productive factor not accounted by K or L (Solow, 1956). A was considered to be total factor productivity, i.e. the way in which the factors of production are combined (Abramovitz, 1956). Later on, the basic model was refined and total factor productivity tended to be represented by technological progress, which was allowed to change over time (Solow, 1957).

$$Q = A(t)K^{\alpha}L^{\beta} \qquad (2)$$

Only production factors enter production directly, although technological change improves productive capacity. Solow residual is a black box that contains all factors that are not accounted by the classic production factors. This includes all forms of intangible capital. Intangible capital is any asset that constitutes a claim to future benefits that does not have a physical or financial embodiment (Lev, 2001).

Denison (1962) and Nadiri (1970) turned the classical production function into an incremental one, which can be divided into the contribution of production factors represented by X_i, each one in a given proportion α_i for a total of n factors of production; the contribution of the improvement in the distribution of resources, represented by Y_j for a series of m aspects concerning the distribution of resources; and, finally, the contribution of knowledge advances, represented by J.

$$\Delta Q = \mu\left(\sum_{i=1}^{n}\alpha_i \Delta X_i + \sum_{j=1}^{m}\Delta Y_j + J\right) \qquad (3)$$

These approaches have been extensively used to quantify the contribution of physical and human capital to production. However, these models are not appropriate to capture the contribution of intangible assets, such as brands, to

production. Given these problems, we propose to use a chain model to account for the impact of intangible assets on production. By implementing an estimation in three steps, our chain model captures the effects of human and physical capital, accounts for resource distribution and measures the contribution of intangibles assets to production. We explain our chain model in detail in the next section.

3. **Proposed Methodology: Chain Model**

We propose our chain model that accounts for intangible capital. We call it a chain model because its estimation is composed of three consecutive phases or steps. In the first phase we estimate the parameters of the log-linearized classical production function using capital and labor:

$$Q_{s,t} = A + \alpha \log(L_{s,t}) + (1-\alpha) \log(K_{s,t}) + ef_{s,t} \qquad (4)$$

where $Q_{s,t}$, $L_{s,t}$ and $K_{s,t}$ are respectively production, human capital and physical capital of a sector s in a period t.

The variation in data that is not captured by these two factors of production $ef_{s,t}$ is the dependent variable in the second equation of the chain. Then, we account for improvements in production due to differences in the distribution of capital in sector *s* at year *t*. Hence, in the second phase of our estimations,

$$ef_{s,t} = \delta_1 + \delta_2 \log(\frac{KICT_{s,t}}{K_{s,t}}) + \delta_3 \log(\frac{KMAC_{s,t}}{K_{s,t}}) + (1-\delta_2-\delta_3) \log(\frac{KINFRA_{s,t}}{K_{s,t}}) + eK_{s,t} \qquad (5)$$

where $KICT_{s,t}$ is investment in information and communication technology (ICT); $KMAC_{s,t}$ is investment in machinery and $KINFRA_{s,t}$ is investment in infrastructures. We divide capital investment into these three selected groups or types of investment. More specificically, we calculate the proportion that each of

these three types of capital investment represent over total investment for every sector *s* and year *t*: $\frac{KMAC_{s,t}}{K_{s,t}}$, $\frac{KINFRA_{s,t}}{K_{s,t}}$, and $\frac{KICT_{s,t}}{K_{s,t}}$. The underlying idea is that the way we distribute capital investment among machinery, infrastructures and ICT may affect productive efficiency.

Once we have estimated the corresponding coefficients of the second estimation phase, we still have some unexplained variation $eK_{s,t}$, which we attribute to brand investments. This is the third phase of the chain estimation (2). We divide brands investments in two categories: expenditures directed to the market (aimed at directly impacting the client) and internal expenditures (they do not aim at the client directly). The former are advertising expenditures ($ADV_{s,t}$) while the latter are expenditures incurred in design, marketing and distribution of the product – intramural expenditures ($IE_{s,t}$). Thus, in our third stage we estimate the impact of advertising and intramural expenditures by sectors on $eK_{s,t}$ in the following way:

$$eK_{s,t} = \eta_1 + \eta_2 \log(ADV_{s,t}) + (1-\eta_2)\log(IE_{s,t}) + e_{s,t} \qquad (6)$$

Both expenditures lead to a competitive advantage for companies based on differentiation and, therefore, we expect them to contribute to value added. Advertising expenditures differentiate brands from competitors directly. In contrast, intramural expenditures improve branded goods and services, via research and development, thus allowing companies to differentiate from competitors. Differentiation contributes to company results and therefore, at a more aggregate level, to economic growth. Apart from advertising and intramural expenditures other variables aiming to manage brands can be easily included in our model.

[2] Notice we have been keeping constant returns to scale (CRS) throughout. We could also lift the CRS restriction by lifting the parameter restriction, but this would imply having to estimate three more parameters with the same number of observations, which we will see are increasingly restrictive in the third estimation phase.

4. Database

In order to proceed to the estimation of the impact of different forms of capital investment distribution, including brand investments, we need a comprehensive database containing information not only on capital and labor expenditures, but also on the distribution of the capital investments into tangible and intangible forms of capital. To obtain useful information for policy making we need to divide the economy into homogeneous sectors and then obtaining information flows from several sources for each of them. For this study, we have collected such information for the Spanish economy as follows.

First of all, we have divided the Spanish economy into 32 sectors at the mesoeconomic level. This classification corresponds to that of NACE classification (Eurostat), which statistics can be broken down to a very detailed sectoral level.

Then, we have constructed our homogeneous database elaborating on information flows from several sources:

- To start with, we need values added by sector, which we calculate in real terms using a volume index, base 2008, from 1970 to 2011. These data are compiled from the INE (Instituto Nacional de Estadística, i.e., National Bureau of Statistics in Spain) National Accounts on bases 1970, 1980, 1995, 2000 and 2008, and then we have rescaled them to the same base year. This is our variable $\mathbf{Q_{s,t}}$.

- Full-time equivalent jobs, base 2008, from 1970 to 2011. Again, we calculate this variable by compiling data from the INE National Accounts, on bases 1970, 1980, 1995, 2000 and 2008 and homogenizing them. This is our variable $\mathbf{L_{s,t}}$.

- Capital stock in volume index, base 2008, from 1970 until 2011, differentiated by typology, namely, technological innovation, machinery and equipment and infrastructure. Data classified by the different uses of capital has been taken from the IVIE (Valencian Institute for Economic Research - *Instituto Valenciano de Investigaciones Económicas*) database. These are our variables $\mathbf{K_{s,t}}$, $\mathbf{KICT_{s,t}}$, $\mathbf{KMAC_{s,t}}$ and $\mathbf{KINFRA_{s,t}}$

- The INE Survey on technological innovation in enterprises offers information on expenditure on R & D targeted to design, other preparations for production and /or distribution. We have compiled these data, available only from 2000 to 2011. This is our variable $\mathbf{IE_{s,t}}$.

- Finally, advertising expenditures by sector. We have employed data collected by Infoadex, particularly advertising expenditures by type of product for the period 2000-2011. We have reallocated these expenditures to the 32 sectors of the economy at the mesoeconomic level. This is our variable $\mathbf{ADV_{s,t}}$.

5. Results

Once we have constructed our comprehensive database of the Spanish economy in recent years, we can proceed to the estimation of our chain model. We present our results in this section. We have used data from 1970 to 2011 in the estimations corresponding to stages 1 and 2. Due to lack of available data, we have estimated the regression of stage 3 using data from 2000 to 2011. We show the estimation results of each stage in table 1, where we have highlighted (underlined) what productive factor, capital investment or branding expenditure is more relevant in each sector.

First estimation phase. This stage allows discriminating the impact of capital versus labor in the production function. The classical production function (Cobb-Douglass) is revealed as an instrument of discrimination by factorial contribution. Typically, labor contribution is approximately 2/3, being capital contribution about 1/3 (Mankiw, Romer and Weil, 1992). However when we move to a sector level we find strong differences in percentages. For the Spanish economy, some sectors have a clear greater labor factor contribution (>0,6). These are food and textile industry, finance and business services, and education, among others. This makes sense since those are the economic sectors typically associated to an intensive use of personnel. According to the first stage regression, these show labor contribution elasticity greater than 10 percent above the national average.

However, we have also sectors with a greatest capital factor contribution (>0.6). These vary as widely as from fishery to telecommunications, and include others such as agriculture, chemical, rubber and plastic, non-metallic products, machinery, electrical, electronic and optical equipment, motor vehicles, furniture and other manufactures, construction, shipping, telecommunications and real estate. These sectors show a capital contribution elasticity greater than 30 percent above the national average.

Second estimation phase. This stage takes the unexplained component of the first estimation of the production function and looks at how much is the contribution of the distribution among different forms of tangible capital. The most intensive capital sectors of the Spanish economy invest mainly in machinery and infrastructure, and seldom in ICT. Within these sectors, fishery and furniture industry are the most machinery intensive in the Spanish economy; chemical industry and construction are the most infrastructure-intensive ones. Only one sector –telecommunications– is ICT intensive. The distribution of tangible capital resources emphasizes the low technological intensity of the Spanish economy, even in those sectors identified as with the highest levels of capitalization in the first phase. Regarding labor intensive sectors we find a similar distribution of investment. Only two sector are ICT intensive: electricity, gas, water and recycling; and personal services. In general investments in these sectors focus on machinery (trade; finance; business services; wood and cork; education), followed by infrastructure (manufacture of coke, refined petroleum products and nuclear fuel; hospitality; activities related to transport).

Third estimation phase. This stage aims to capture the remaining variation in production that is attributed to forms of intangible capital, particularly brand investments. We have divided expenditures in this intangible capital into two forms: those directly addressed to the final consumer and those that are not, as explained above. The former refer to advertising, while the latter are all intramural expenditures devoted to design, marketing and distribution for every year in every sector. We understand that both improve the value of the companies' brands and constitute an investment to increment the value of intangible capital.

The results of this last regression reveal that the average elasticity coefficient of advertising expenditure stands around 70 percent, varying across sectors. Below this threshold, we find

sectors that range from rubber and plastic industry to real estate services, and contain all transportation related sectors. Advertising seems to be less important in these sectors as opposed to having a good product design and distribution. However, they still show a higher elasticity for elasticity than for intramural expenditures. On the other hand the most advertising intensive sectors range from food industry to motor vehicles.

Hence, in general we find that the production response to advertising is positive and more effective than expenditure on intramural design and marketing. Expenditures on brand advertising directed to the final consumer prevail, i.e., those with direct impact and predictably with a more immediate effect on production. Still, we need to have in mind that these two forms of intangible capital creation are complementary actions. Both are necessary.

Labour vs. capital intensity and capital distribution in intangible capital creation

Bringing together the three consecutive phases of the nested chain estimation we gain a more holistic perspective of our results. First, we have estimated the classical Cobb-Douglass production function of the Spanish economy with capital and labor. This allowed classifying all economic sectors according to whether they are more capital or labor intensive. In the second phase we have identified which sectors enjoy higher value added elasticities on machinery, infrastructures or ICT expenditures, as forms of tangible capital. Finally, regardless of the result of the distribution of tangible capital second stage regression, all sectors respond in the same way in the third stage: value added is much more elastic to expenditure in advertising than to expenditure in design and distribution. And this is true for both capital and labor intensive sectors.

Cluster analysis

Finally, we have applied cluster analysis to sector elasticities in order to identify investment patterns among Spanish sectors. In particular, we have employed hierarchical cluster analysis (Ward method). This clustering procedure reveals the existence of three groups of sectors, with different elasticity levels in terms of labor vs. capital and capital distribution. The results of the first and second estimation stages of our models seem again to be the

most discriminating variables among sectors (figure 1). Average advertising elasticities are quite similar for the three clusters: 0.79, 0.75 and 0.81.

Cluster 1 (thirteen sectors) is the only capital intensive group (0.72 in average elasticity for capital). This capital contributes more to production when devoted to infrastructure and machinery than to ICT(average elasticities are 0.40, 0.39 and 0.21 respectively). This group includes agriculture; fisheries; chemicals; rubber and plastic; non-metallic products; machinery and equipment; electrical equipment, electronic and optical; motor vehicles; furniture and other manufacturing; extractive; shipping; telecommunications; and real estate.

Clusters 2 and 3 are labour intensive sectors. In cluster 2 (six sectors), the average elasticity of labour is 0.61. It includes manufacture of coke, refined petroleum products and nuclear fuel; paper, printing and publishing; construction; hospitality; activities related to transport; and public administration. On average, capital in these sectors contributes more to production when devoted to infrastructures (0.71), than when employed in machinery and ICT (0.21 and 0.09 respectively).

Cluster 3 (thirteen sectors) includes the following sectors: food, beverages and snuff; textile, clothing, leather and footwear; wood and cork; metallurgy and metal products; electricity, gas, water and recycling; trade; ground transportation; air and space transport; finance; business services; personal services; education; and health and social services. These sectors show a higher average elasticity for labour than cluster 2 (0.78). Regarding capital distribution, the higher elasticity relies on machinery (0.56), followed by relatively similar values in ICT and infrastructures (0.24 and 0.19, respectively).

To sum up, cluster 1 includes capital intensive sectors, for which machinery and infrastructures are equally important. Clusters 2 and 3 are labour intensive groups. Cluster 2 obtains a higher return from investing in infrastructures whereas in cluster 3 machinery contributes more heavily to value added. In the three clusters, the importance of advertising is high and quite homogeneous among them.

6. Conclusions and future research

In this study, we present a methodology for quantifying the impact of branding investment in economic growth. In particular, we propose a three phase estimation process that accounts for the effect over production of human and physical capital; the allocation of capital; and of brand investments. These investments are revealed significant, particularly to the inclusion of advertising and intramural expenditures, and, in the case of the Spanish economy, seldom vary across sectors.

Hence, our results show that in this particular case the efforts to strengthen the brand materialize in advertising spending more intensively than in intramural expenditures. Expenditure on R & D dedicated to design and marketing is revealed as valid instrument to boost demand, but of low integration into most of the productive activities. Overall, reducing margins and cost control in recent years due to contraction of domestic demand has led to a slowdown in corporate branding effort (defined as the aggregate expenditure in advertising and design and marketing).

Policy makers might evaluate these results, assess whether this investing pattern is adequate for their companies and, if not, propose correcting policies. Note that company differentiation via advertising is only effective in the markets where the ads are broadcasted or published, i.e. advertising campaigns tend to have an area of action limited to the country. However, intramural expenditures create company differentiation that can be exploited not only in national markets but also in foreign markets. In other words, intramural expenditures could be enhanced among Spanish companies in order to reach a strong and sustainable differentiation that constitutes a solid base for internationalization. The benefits of internationalization are well-known.

Our results is not exempt of limitations. Firstly, we have assumed constant returns to scale in the three steps of our model. This restriction, although valid in general, could not apply to some specific sectors. Secondly, the data series employed in the third stage of our estimation comprise only a period of twelve years. Although still valid for estimation purposes it would be strongly desirable to have larger data series. Finally, our methodology allows assessing the impact of brand investments on economic growth. Nevertheless we

cannot measure the relative contribution of brands to production. Solving these three limitations constitute interesting venues for further research.

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Table 1. Estimation results

Sector	Stage 1		Stage 2			Stage 3	
	L	K	KICT	KMAC	KINFRA	IE	ADV
Agriculture	0,2677	0,7323	0,1767	0,5869	0,2364	0,0168	0,9832
Fisheries	0,2126	0,7874	0,1291	0,6021	0,2688	0,4986	0,5014
Manufacture of coke, refined petroleum products and nuclear fuel	0,6186	0,3814	0,0587	0,0985	0,8428	0,0706	0,9294
Food, beverages and snuff	0,6074	0,3926	0,2194	0,5527	0,2279	0,1613	0,8387
Textile, clothing, leather and footwear	0,6430	0,3570	0,2650	0,6093	0,1257	0,0017	0,9983
Wood and cork	0,8231	0,1769	0,1745	0,6498	0,1757	0,1609	0,8391
Paper, printing and publishing	0,5863	0,4137	0,1652	0,1954	0,6394	0,2196	0,7804
Chemicals	0,2693	0,7307	0,1543	0,0018	0,8439	0,1623	0,8377
Rubber and plastic	0,3908	0,6092	0,1898	0,3392	0,4709	0,3095	0,6905
Non-metallic products	0,4286	0,5714	0,3156	0,4536	0,2308	0,0610	0,9390
Metallurgy and metal products	0,7619	0,2381	0,2228	0,4664	0,3108	0,2345	0,7655
Machinery and equipment	0,2802	0,7198	0,1188	0,1675	0,7137	0,0757	0,9243
Electrical equipment, electronic and optical	0,1792	0,8208	0,1836	0,2956	0,5208	0,3635	0,6365
Motor vehicles	0,1372	0,8628	0,0026	0,3653	0,6321	0,1022	0,8978
Furniture and other manufacturing	0,2806	0,7194	0,2499	0,7058	0,0443	0,1931	0,8069
Extractive	0,4952	0,5048	0,5054	0,3108	0,1838	0,0320	0,9680
Electricity, gas, water and recycling	0,9373	0,0627	0,4803	0,3175	0,2023	0,1090	0,8910
Construction	0,3886	0,6114	0,0815	0,1545	0,7640	0,3609	0,6391
Trade	0,7927	0,2073	0,1735	0,6997	0,1267	0,0296	0,9704
Hospitality	0,7351	0,2649	0,0532	0,2092	0,7376	0,2230	0,7770
Ground Transportation	0,5351	0,4649	0,1948	0,5957	0,2095	0,3727	0,6273
Shipping	0,3133	0,6867	0,0006	0,5340	0,4654	0,4044	0,5956
Air and space transport	0,7687	0,2313	0,2422	0,5290	0,2288	0,3830	0,6170
Activities related to transport	0,7658	0,2342	0,0296	0,3519	0,6185	0,3412	0,6588
Telecommunications	0,0378	0,9622	0,3865	0,3224	0,2912	0,1526	0,8474
Finance	0,7451	0,2549	0,1671	0,6788	0,1540	0,2535	0,7465
Real estate	0,3239	0,6761	0,2672	0,3975	0,3354	0,3049	0,6951
Business Services	0,7760	0,2240	0,0475	0,6499	0,3027	0,0776	0,9224
Personal services	0,8167	0,1833	0,4397	0,3682	0,1921	0,2850	0,7150
Public administration	0,5655	0,4345	0,1352	0,2301	0,6346	0,2816	0,7184
Education	0,9725	0,0275	0,2194	0,6497	0,1309	0,1326	0,8674
Health and social services	0,9107	0,0893	0,3046	0,5751	0,1203	0,2882	0,7118

L: human capital; K: physical capital; KICT: investments in information and communication technology;
KMAC: investments in machinery; KINFRA: investments in infrastructure; IE: intramural expenditures; ADV: adversiting expenditures

Figure 1 Cluster analysis: average elasticities