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Market Power influence on the Suboptimal levels of Investment: Evidence from Ecuador

Influencia del poder de mercado en los niveles subóptimos de inversión: evidencia de Ecuador

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ABSTRACT

The levels of investment in Ecuador have been low, while the levels of market power have increased in certain sectors. The objective of our study is to evaluate the social optimal levels of investment of the Ecuadorian firms and their relationship with market power, through the comparison of profitability rates and concentration indices to examine if they are consistent with the expected behavior of a competitive market. We use the balance sheets reported by the firms to the Superintendencia de Compañías, Valores y Seguros (SCVS), and the information of macroeconomic variables from the Central Bank. With this panel data we estimated a fixed effects model considering as dependent variables the profitability (return on assets, ROA) and investment, and as main independent variable the level of market power (Herfindahl-Hirschman Index). The results suggest that the level of concentration has a positive relation with the profitability and a negative relation with corporate investment.

Keywords: Investment, market power, profitability rates.

RESUMEN

Los niveles de inversión en Ecuador han sido bajos, mientras que los niveles de poder de mercado se han incrementado en ciertos sectores. El objetivo de nuestro estudio es evaluar los niveles óptimos de inversión de las firmas ecuatorianas y su relación con el poder de mercado, mediante la comparación de las tasas de rentabilidad y el índice de concentración para examinar si son consistentes con el comportamiento esperado de un mercado competitivo. Usamos los estados financieros que reportan las firmas a la Superintendencia de Compañías, Valores y Seguros (SCVS) y la información macroeconómica del Banco Central del Ecuador. Con un panel de datos, estimamos un modelo de efectos fijos considerando como variable dependiente la rentabilidad (rentabilidad sobre los activos, ROA) y la inversión, y como la variable independiente principal usamos el nivel de poder de mercado (Índice Herfindahl-Hirschman). Los resultados sugieren que el nivel de concentración tiene una relación positiva con la rentabilidad y negativa con la inversión empresarial.

Palabras claves: Inversión, poder de mercado, rentabilidad.

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I. INTRODUCTION

The determinants of economic activity have been extensively discussed; among those determinants, investment is one of the mainly studied. The combination of public (done by the government) and private investment (private sector, formal firms) could lead to growth in the economy; as Keynes (1936) mentioned that small changes in investment could lead to a great increase in employment levels. In terms of private investment, it is well known that corporate investment is an important determinant of economic growth and well-being, hence corporate investment policies are well worth studying (Sarkar, 2011).

The levels of investment in Ecuador have been low lately because the investment growth was mainly driven by the public sector, whereas the private sector had a mild growth (BID, 2020). Private investment was specially affected after 2007 by the fall in oil prices and the structural vulnerabilities that constrained private sector investment, also between 2007 and 2015 the government imposed several taxes to imports that deterred the private investment in certain sectors, then in 2016 Ecuador was affected by the earthquake and the continuous decrease of the oil price (World Bank, 2018). This country has had several external shocks, such as the earthquake, the oil price, the pandemic in 2020, and internal factors, like laws and taxes, that affected the investment of firms.

Another important issue to consider in Ecuador, and that could be related with the levels of investment, is the market power. Several types of business such as supermarkets, pharmacies chains, communication sector, banks, among others, are highly concentrated (Sanchez et al., 2018). For instance, Camino-Mogro and Armijos-Bravo (2018) and Uzcategui-Sanchz et al. (2018) find that there is an oligopolistic structure in the banking sector. Because of this issue of market concentration, the government created the Superintendencia de Control y Poder de Mercado, in 2012. This institution has had more than 150cases of market and 50% of them approximately comply all the conditions to be controlled and regulated by this entity.

Hence, the objective of our study is to evaluate the social optimal levels of investment of the Ecuadorian firms and their relationship with market power, through the comparison of profitability rates and concentration indices to examine if they are consistent with the expected behavior of a competitive market. To accomplish this objective, we use data from the Superintendencia de Compañías, Valores y Seguros and the Central Bank of Ecuador. We first calculate a Herfindahl-Hirschman Index (HHI) to measure the level of market power in the economy and then in each sector. After that, we estimate a fixed-effects model to examine the relationship between market power (HHI) and investment. Our identification strategy lies in the use of fixed-effects and control variables to address possible omitted variable bias issues.

This article is organized as follows: on the second section we present the literature review to present the context and relevant information about this topic. On the third section we describe the data and methodology. Then, on the following section are presented the main results. And the last section provides the conclusions.

II. LITERATURE REVIEW

Investment can be studied under several approaches such as optimal timing, size of irreversible investment and strategic purpose of the investment. Optimal timing is an important determinant of a firm's investment (Sarkar, 2011) and was first investigated by McDonald and Siegel (1986) and Pindyck (1988).

Literature has focused more on the timing than on the intensity or size of investment. Huisman and Kort (2015) for instance analyze investment decisions and the role of timing. They base their analysis on the models considered by Bar-Ilan and Strange (1999) The first one only takes in consideration the optimal size of investment, while the second one considers incremental investment and only includes

the intensity. Both models are one dimensional and their results are explicit and similar; one fact in common they shared is that uncertainty discourages investment. The third model refers to lumpy investment and considers two dimensions. In this case, the model is ambiguous but it reveals that uncertainty can delay investment but at the same time it increases the size (intensity) of it. Therefore, the role of timing as uncertainty plays an important role in investment. Then, it is also relevant to mention how investment can be related with productivity, profitability and growth.

The link between productivity, profitability, investment and corporate growth can be divided into two approaches. The first one is a direct channel that states that firms grow more than competitors by setting lower prices. In the other hand, the indirect channel says that efficient firms in a competitive market should have higher profits and would invest more, and consequently gain market shares (Syverson, 2011). For example, Yu et al (2017) studied this circle for China. The authors stated that the only noticeable profitability-growth relationship is via investment. They concluded that the motor of this circle is learning and innovation, stimulated by corporate investment and growth.

The value of real options and their optimal structure are related with industry structure. Not only industry but also market structures affect corporate investment patterns. These structures also define competition among the firms and create market failures that have been widely studied. Jiang et al (2015) found a positive relation between corporate investment and product market competition. The authors also concluded that investment sensitivity to proxies for financial status and risk also depend on industry concentration[3].

Furthermore, Pereira and Rodrigues (2014) evaluated investment decisions in finite-lived monopolies. They concluded that a certain-lived monopolist protected from preemption will delay investment even more that in the case of a perpetual monopoly. The authors highlight the significant impact of operating in different finite-lived monopoly and emphasized that uncertainty obstructs investment in all market structure settings. In a similar way, Chortareas (2021) examined if firms' competitive position determines their corporate investment decisions under uncertainty in an emerging economy characterized by high market concentration. They found that firms with low market power are more willing to invest, while firms with high market power delay investment. They conclude that imperfect competition has a stronger effect in the negative relationship between uncertainty and investment.

III. DATA AND METHODOLOGY

In this study, we investigate the relationship between concentration and profitability. After that, we examine the following hypothesis:

H1. The firms that have more market power are more profitable, however they do not invest as they should because they are behaving as monopolists and not as firms in a competitive market.

We use data from the Superintendencia de Compañías, Valores y Seguros; specifically we use the balance sheet that the firms report each year. The information obtained was firm level data; the firms are classified according to the International Standard Industrial Classification of All Economic Activities (ISIC 6)(ISIC Codification can be found in Appendix A). The period of study is from the year 2006 to 2019.

[3] Caballero (1991), Pindyck (1993), Sakellaris (1994) and others model investment under uncertainty (see Dixit and Pindyck (1994)). Galeotti and Schiantarelli (1994), Sakellaris (1995), Leahy and Whited (1996), Minton and Schrand (1999), and Andrade and Stafford (2004) test the empirical relation between risk and investment.

Sample and variables

At first, the sample had in total 239,389 observations. To debug the data base, we eliminated the observations that presented inconsistencies, such as, negative equity, negative assets, and firms that had positive profits but no income, following the process of filtering of Camino-Mogro et al. (2018). Additionally, we erased the observations from three sectors, because they are more related with public sector. These sectors are: D (electricity, gas, steam and air conditioning supply), E (water supply; sewerage, waste management and remediation activities), and O (public administration and defense; compulsory social security). Finally, we obtained 28,098 observations in total and 2,007 firms per year.

First, to measure the profitability, we calculate the return on assets (Pattitoni et al, 2014) and use it as dependent variable to evaluate it with level of concentration obtained from estimating the Herfindahl-Hirschman Index of the firms (Akdoğu & MacKay, 2008). As control variable, at micro-level is considered the natural logarithm of total assets and efficiency. At macro level variables, we used the annual growth rate of gross domestic product (GDP) (Jiang et al, 2015) of Ecuador at constant prices (base year: 2007) (see Appendix A and Table 1).

Dependent variable	
ROA (eq. 1)	Returns on assets defined as the ratio of net income to total assets. This variable is our proxy for firm profitability.
Investment (eq. 2)	Our proxy for investment is calculated as the rate of change of the level of assets.
Concentration	
Herfindahl-Hirschman Index (HHI)	HHI to measure the degree of concentration in an economic sector.
Micro-level variables	
Efficiency	Efficiency ratio calculated as total income to total assets.
Ln assets	Natural logarithm of total assets.
Dexport	Dummy variable that takes the value of 1 if the firm exports.
Macro-level variables	
Ecoe	Economies of scale.
Ggdp	Annual growth rate of GDP.
Note: *Equations can be found in Appendix A*	

Table 1. Relevant variables definition

Then, to analyze the level of investment, as dependent variable we consider the investment calculated as the rate of change of the level of assets. On this analysis the Herfindahl-Hirschman Index is also considered as an independent variable. In contrast to the previous analysis, we consider as control variable, at micro-level a dummy variable that indicates if the firms export or not. At macro-level, we used the economies of scale calculated as the division of the gross domestic product at constant prices (base year: 2007) to the number of firms per sector (equations can be found in Appendix B).

We started analyzing other variables and ratios such as debt, liquidity and annual sales growth as control variables. In Table 1, we describe the variables used in our final model, the ones that gives the best possible estimations. The descriptive statistics of these variables are shown in Table 2, by sectors and for the total sample. The mean and standard deviation were calculated for all the relevant variables.

	Roa	Inv	Herfin	Efficiency	Ln assets	Dexport	Ecoe	Ggdp
A	0.0182	0.793	0.517	0.665	9.335	0.0439	23,094	0.0282
	(0.0796)	(0.331)	(0.343)	(5.621)	(2.822)	(0.205)	(2,663)	(0.0257)
B	0.0365	0.653	0.638	0.325	11.00	0.0323	23,7611	0.0280
	(0.115)	(0.394)	(0.386)	(0.950)	(3.635)	(0.177)	(27,430)	(0.0257)
C	0.0353	0.585	0.556	0.938	10.843	0.104	41,226	0.0282
	(0.130)	(0.363)	(0.470)	(2.541)	(3.467)	(0.306)	(4,759)	(0.0257)
F	0.0290	0.746	0.678	1.138	9.279	0.0122	43,882	0.0286
	(0.123)	(0.353)	(0.249)	(15.759)	(2.911)	(0.110)	(5,084)	(0.0259)
G	0.0403	0.672	0.546	1.415	9.720	0.0303	11,849	0.0282
	(0.559)	(0.381)	(0.341)	(12.017)	(3.014)	(0.171)	(1,368)	(0.0257)
H	0.0606	0.875	0.338	2.203	8.030	0.0366	16,448	0.0284
	(0.356)	(0.255)	(0.264)	(10.459)	(2.129)	(0.188)	(1,902)	(0.0258)
I	0.0411	0.692	0.576	1.198	9.870	0.0181	35,1844	0.0280
	(0.0965)	(0.334)	(0.189)	(2.012)	(2.490)	(0.134)	(40,731)	(0.0256)
J	0.0311	0.678	0.561	0.787	9.246	0.0177	147,555	0.0282
	(0.0802)	(0.370)	(0.442)	(2654)	(2.662)	(0.132)	(16,988)	(0.0259)
K	0.0434	0.692	0.609	0.285	10.998	0.0324	237,627	0.0281
	(0.174)	(0.366)	(0.423)	(0.755)	(2.739)	(0.177)	(27,983)	(0.0256)
L	0.0221	0.693	0.0850	0.263	9.349	0.00519	7,809	0.0286
	(0.422)	(0.405)	(0.137)	(3.926)	(2.297)	(0.0719)	(902)	(0.0259)
M	0.0644	0.713	0.602	0.962	8.797	0.0244	34,247	0.0279
	(0.785)	(0.364)	(0.356)	(4.510)	(2.271)	(0.154)	(3,955)	(0.0256)
N	0.0758	0.747	0.493	2.404	8.834	0.0322	45,491	0.0281
	(0.962)	(0.337)	(0.350)	(21.29)	(2.529)	(0.177)	(5,256)	(0.0257)
P	0.0465	0.781	0.528	0.675	9.144	0.0182	351,505	0.0287
	(0.129)	(0.328)	(0.439)	(1.594)	(2.954)	(0.134)	(40,859)	(0.0256)
Q	0.0555	0.929	0.725	1.366	8.585	0.0167	498,709	0.0271
	(0.389)	(0.138)	(0.448)	(5.506)	(2.566)	(0.129)	(55,329)	(0.0256)
R	1.291	0.978	0.308	6.585	6.940	0	2,289,643	0.0281
	(6348)	(0.0671)	(0.471)	(31.225)	(0.882)	0	(268,708)	(0.0262)
S	0.0142	0.646	0.435	0.631	9.262	0.0161	965,896	0.0288
	(0.0387)	(0.416)	(0.500)	(1.019)	(2.311)	(0.127)	(112,492)	(0.0262)
All	0.0392	0.726	0.389	1.056	9.280	0.0276	36,618	0.0283
sectors	(0.511)	(0.369)	(0.366)	(9.440)	(2.718)	(0.164)	(105,480)	(0.0258)

Notes: *The table displays mean values for the variables, by sectors and for the total sample. Standard deviations are in parenthesis. Economies of scale in U.S. dollars*

Table 2. Descriptive statistics of relevant variables by sectors and total sample

Panel data with fixed effects

The data used is structures as panel data, and the estimations done are panel data regressions with fixed effects. These fixed effects help control for any other variable or determinants that have been omitted but are constant in time. Consider the model:

$$y_{i,t} = X_{i,t}\beta + \mu_i + \varepsilon_{i,t} \qquad i = 1, \dots, N; \qquad t = 1, \dots, T$$

Where $y_{i,t}$ is our dependent variable for each firm i at time t, $X_{i,t}$ is a regressor matrix with the independent variables, μ_i denotes the unobserved effect, $\varepsilon_{i,t}$ is an idiosyncratic error term and β is a vector of coefficients to be estimated. The model we estimated is static and clustered standard errors were included.

First regression: Return on assets considered as the dependent variable and Herfindahl-Hirschman Index is the independent variable. Efficiency ratio and natural logarithm of total assets are the micro-levels variables and the annual growth rate of GDP was included as macro-level variable. The regression can be written as:

$$ROA_{i,t} = \beta_1 herfin + \beta_2 efficiency + \beta_3 lnassets + \beta_4 ggdp + \mu_i + \varepsilon_{i,t} \qquad (eq.1)$$

Second regression: Investment considered as the dependent variable and Herfindahl-Hirschman Index is the independent variable. A dummy of exports was used as micro-level variable and GDP was divided to the number of firms and represents the economies of scale as macro-level variable. The regression can be written as:

$$INV_{i,t} = \beta_1 herfin + \beta_2 dexport + \beta_3 ecoe + \mu_i + \varepsilon_{i,t} \qquad (eq.2)$$

IV. RESULTS

In table I, we present the results of the first regression $(eq.1)$.

As it was expected, sectors known to have more concentration are the ones that have more profitability. The general regression that considers all the industrial sectors indicates that there is a positive relationship between concentration and profitability. As there is an increase on the Herfindahl-Hirschman Index, a 0.074 increase occurs in profitability. Then, the regression was done for each sector, indicates that there is a significant positive relationship between both variables only on the sectors: C (manufacturing), F (construction), G (wholesale and retail trade; repair of motor vehicles and motorcycles), N (administrative and support services activities), P (education), Q (human health and social work activities) and S (other service activities). There is a significant negative relationship on the sector M (professional, scientific and technical activities).

The manufacturing industry is the second most important activity in the generation of sales in the Ecuadorian economy (INEC, 2013). This industry includes six branches that represents the 69% of the industry's sales. For example, food and beverages had an increased in the concentration rate. Variations in the concentration among the different branches on the industry are due to natural entry barriers (Bain, 1951). The wholesale and retail sector is one of the biggest sectors in terms of numbers of firms.

Variables	**Return on Assets (ROA)**								
	All sectors	**A**	**B**	**C**	**F**	**G**	**H**	**I**	**J**
HHI	0.074***	-0.002	0.004	0.037**	0.031***	0.023*	-0.014	-0.084	-0.020
	(0.0161)	(0.006)	(0.013)	(0.0112)	(0.018)	(0.030)	(0.045)	(0.067)	(0.016)
Efficiency	0.022***	0.003***	0.075***	0.023***	0.001**	0.033**	0.010***	0.032***	0.003**
	(0.000)	(0.000)	(0.004)	(0.001)	(0.002)	(0.005)	(0.001)	(0.004)	(0.001)
Ln Assets	0.000	0.002**	0.0002	-003	0.003*	0.008	-0.015**	0.000	0.009**
	(0.940)	(0.000)	(0.002)	(0.002)	(0.125)	(0.005)	(0.006)	(0.005)	(0.003)
Ggdp	0.231**	0.027	0.211	0.2558**	0.337**	0.433*	0.126	0.247	0.145
	(0.023)	(0.053)	(0.134)	(0.110)	(0.125)	(0.226)	(0.216)	(0.213)	(0.122)

R-square overall	0.1328	0.0975	0.5204	0.2558	0.0207	0.4744	0.0709	0.4984	0.0850
Observations	25,559	2,529	248	1,418	1,309	4886	3,528	166	396
Number of firms	2,007	203	20	114	110	406	278	13	31
	K	**L**	**M**	**N**	**P**	**Q**	**R**	**S**	
HHI	0.049	0.001	-0.126**	0.809***	0.135**	0.099**	-0.102	0.10**	
	(0.037)	0.049	(0.040)	(0.124)	(0.2683)	(0.033)	(0.131)	(0.026)	
Efficiency	0.143***	0.045***	0.168***	0.004**	0.055***	0.073***	0.204***	-0.001	
	(0.020)	(0.001)	(0.002)	(0.002)	(0.005)	(0.003)	(0.002)	(0.008)	
Ln Assets	0.002	-0.001	-0.008	-0.0001	0.015**	0.021	-0.020	-0.005	
	(0.007)	(0.003)	(0.008)	(0.026)	(0.007)	(0.017)	(0.061)	(0.005)	
Ggdp	-0.542	0.158	0.474	1.532	0.200	1.341**	0.175	-0.105	
	(0.391)	(0.179)	(0.338)	(0.976)	(0.255)	(0.001)	(1.866)	(0.188)	
R-square overall	0.1384	0.1854	0.7228	0.0091	0.3912	0.8948	0.9989	0.1993	
Observations	247	7,509	1,678	1,272	165	120	26	62	
Number of firms	24	599	149	102	13	10	2	5	

Table I. Panel data estimation results: Effect of concentration on profitability (ROA)
Notes: Standard error in parentheses. *** p<0.01, ** p<0.05, * p<0.1

The construction sector is also important for the economy. Over the years, the annual rate of construction as a percentage of GDP has been increasing This sector also requires a significant investment. In contrast with the sectors N, P, Q and S, they do not represent a major percentage in the market (as a number of firms in the total economy). Professional, scientific and technical activities are an undeveloped sector, where few firms have invested.

In table II, we present the results of the second regression$(eq.2)$.

With this second regression we wanted to examine whether the firms that have more concentration on the market, are the ones that invest less which is shown in the general regression. As there is an increase on the Herfindahl-Hirschman Index, a -0.048 decrease occurs in investment. In this case, the general analysis, the one that includes all sectors, presents a negative significant relation on the variables of interest: Herfindahl-Hirschman index and investment. Then, the regression done for each sector, indicate the same negative relation for the sectors: C (manufacturing), F (construction), G (wholesale and retail trade; repair of motor vehicles and motorcycles), H (transportation and storage), M (professional, scientific and technical activities), P (education), Q (human health and social work activities), R (arts, entertainment and recreation) and S (other service activities) present a significant negative relationship between concentration and investment. This means that firms that have more market power invest less on assets.

Variables	**Investment (change on assets)**								
	All sectors	**A**	**B**	**C**	**F**	**G**	**H**	**I**	**J**
HHI	-0.048***	-0.006	0.122*	-0.159***	-0.076**	-0.091***	-0.056**	-0.089	-0.036
	(0.007)	(-0.020)	(0.068)	(0.021)	(0.032)	(0.016)	(0.022)	(0.244)	(0.049)
Dexport	-0.045***	-0.043	-0.363***	0.004	-0.096	-0.052**	-0.043**	-0.117	-0.391**
	(0.011)	(0.029)	(0.110)	(0.033)	(0.058)	(0.023)	(0.019)	(0.174)	(0.112)
Economies of	2.16E-07**	0.000***	2.73E-07	4.04E-07	1.02E-06	0.000***	-5.96E-	-9.35E-	-3.57E-07

scale							06***	07	
	(7.61E-08)	(1.47E-6)	(6.26E-07)	(1.19E-06)	(1.06E-06)	(2.22E-06)	(1.41E-06)	(4.89E-07)	(6.04E-07)
R-square overall	0.0098	0.0189	0.0310	0.1054	0.0086	0.0261	0.0577	0.0308	0.0719
Observations	27,565	2,731	268	1,532	1,408	5,286	3,805	179	427
Number of firms	2,007	203	20	115	110	408	278	13	31
	K	**L**	**M**	**N**	**P**	**Q**	**R**	**S**	
HHI	0.096*	0.063**	-0.078***	-0.034	-0.153**	-0.054**	-0.078**	-0.717***	
	(0.056)	(0.029)	(0.024)	(0.028)	(0.051)	(0.026)	(0.035)	(0.087)	
Dexport	0.027	-0.050	0.003	-0.010	0.060	0.005	0.000	0.038	
	(0.091)	(0.042)	(0.045)	(0.048)	(0.130)	(0.074)	(0.001)	(0.223)	
Economies of scale	1.01E-06**	-7.11E-07	2.86E-06**	3.37E-06***	4.32E-07	3.82E-07	-3.14E-09	-5.15E-08	
	(4.96E-07)	(2.85E-06)	(1.24E-06)	(1.02E-06)	(3.68E-07)	(1.48E-07)	(4.81E-08)	(2.52E-07)	
R-square overall	0.0020	0.0001	0.00011	0.0196	0.0046	0.0713	0.2607	0.7288	
Observations	268	8,063	1,823	1,373	178	130	28	66	
Number of firms	24	599	149	102	13	10	2	5	

Table II. Panel data estimation results: effect of concentration on profitability (Investment as change on assets)
Notes: Standard error in parentheses. *** p<0.01, ** p<0.05, * p<0.1

The construction sector is one of the most representative (in contrast with the sectors above) and the one with a bigger impact in the Ecuadorian economy. Since 2015, this sector has been in an economic slowdown. Entrepreneurs have been taking austere actions such us cutting staff resources and stopping the investment in this sector. However, this sector has not showed significant amount of investment over the years.

V. CONCLUSIONS

In this study we investigated how the private sector levels of investment and profitability can be related with the market power that prevails in the economy. We did this analysis using all the firms of the formal sector of Ecuador, and then evaluated how the results changed depending on the economic sector they belong to (ISIC).

The results suggest that higher concentration leads to higher profitability (measure with the ROA ratio). This result was consistent for all sectors as a group and for the sectors: C (manufacturing), F (construction), G (wholesale and retail trade; repair of motor vehicles and motorcycles), N (administrative and support services activities), P (education), Q (human health and social work activities) and S (other service activities). There is a significant negative relationship on the sector M (professional, scientific and technical activities). Furthermore, the estimates of the second regression showed that concentration has a negative relation with investment; in the aggregate regression and for the sectors: C (manufacturing), F (construction), G (wholesale and retail trade; repair of motor vehicles and motorcycles), H (transportation and storage), M (professional, scientific and technical activities), P (education), Q (human health and social work activities), R (arts, entertainment and recreation) and S (other service activities). These results are clearly evidence that in Ecuadorian economy market power affects firm's profitability and investment level.

These findings have important implications for policy makers. First, even though concentration can lead to higher levels of profitability it can diminish the levels of investment. Therefore, targeted

policies could be drawn to specific sectors depending on whether we found concentration was good for the economy or not. For instance, where we found that concentration might have more benefits than disadvantages, such as the sector N (administrative and support services activities) an antimonopoly policy should not be established. Second, besides targeted policies, design better policies that aim to attract and increase investment opportunities such as reducing specific taxes or reducing the burden of bureaucratic and administrative procedures. Third, concentration is found to be harmful for some specific sectors, so policies need to be implemented in order to control market power and ensure a competitive market.

Appendix A. ISIC Codification

Sectors	
A	Agriculture, forestry and fishing
B	Mining and quarrying
C	Manufacturing
D	Electricity, gas, steam and air conditioning supply
E	Water supply; sewerage, waste management and remediation
F	Construction
G	Wholesale and retail trade; repair of motor vehicles and motorcycles
H	Transportation and storage
I	Accommodation and food service activities
J	Information and communication
K	Financial and insurance activities
L	Real estate activities
M	Professional, scientific and technical activities
N	Administrative and support service activities
O	Public administration and defense; compulsory social security
P	Education
Q	Human health and social work activities
R	Arts, entertainment and recreation
S	Other service activities

Appendix B. Equations

Return on Assets (ROA):

$$ROA = \frac{Net\ Income}{Total\ Assets}$$

Herfindahl-Hirschman Index (HHI):

$$HHI = \sum_{i=1}^{N} s_i^2$$

Where:

s_i^2: market share of firm *i* in the market

N: number of firms

Efficiency

$$Efficiency = \frac{Total\ income}{Total\ assets}$$

Economies of Scale:

$$EScale = \frac{GDP}{N}$$

Where:

GDP: gross domestic product at constant prices

N: number of firms per sector

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