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Rate of Profit in the United States and in China (2007–2014): A Look at Two Trajectories and Strategic Sectors

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Abstract

This paper investigates the turbulent behavior that might exist under a national average rate of profit. We use a database—ORBIS—that allows our investigation to start from the level of the firm, with data from 2007 to 2014. A comparison between the United States and China organizes the statistical description of the rates of profit in those countries. Three issues are investigated: the trajectories of the national average rate of profit and their disaggregation; the distribution of different rates of profit by firms, economic sectors, and manufacturing sectors, and the stability of those distributions over time.

JEL Classification: P16, O33

Keywords

rate of profit, different national rates of profit, intersectoral differences in profitability

1. Introduction

Profit is an economic variable that can be described as a "synthesis of multiple determinations." It summarizes the workings of a capitalist economy. Marx initiates the discussion of this variable in the beginning of the third volume of *Capital* when he investigates the competition among different capitals. One would suggest that the reading of the two previous volumes is a prerequisite for a better comprehension of the meaning of profit and the rate of profit (Marx 1894: part 1).

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Being a "synthesis of multiple determinations," it is not surprising that an analysis of the long-term behavior of the profit rate in the leading capitalist country, namely the United States, between 1870 and 2010—according to data organized by Duménil and Lévy (2015, 2016)—should display the "fingerprint" of complexity (Ribeiro et al. 2017a: 295).

It is also understandable that the average is formed in the competition between capitals through the ever-changing actions of large sets of firms producing to supply ever-changing markets, firms that profit from their innovations and their efforts to produce under relatively more advanced production conditions. These firms operate in different sectors and industries, shaping multiple layers of production, interaction, competition, and cooperation. The national average rate of profit might be an aggregate result of all those actions.

Different rates of profit by firms, sectors, and industries have been discussed for a long time. There are at least two strands of the literature that investigate the intrasectoral and intersectoral differences: on one hand, the literature discussing rate of profit; its differentiation vis-à-vis individual capitals, industries, and countries; and its movements over time (triggered by Marx 1894; reviewed by Botwinick 2017: ch. 5); and, on the other hand, the literature about interindustry differentiation of rate of profit (triggered by Bain 1951, 1956, and reviewed by Scherer and Ross 1990; Schmalensee 1989, and Semmler 1981).

This paper investigates the turbulent behavior that might underlie this national average rate of profit. For this investigation we use a database—ORBIS—that allows our investigation to start at a company level, with data from 2007 to 2014.

ORBIS provides comparable information on private firms worldwide with measures of profit rate, allowing us to develop a comparative research on the behavior of the rate of profit. The data provided by ORBIS allow us to contribute to academic discussions on the rate of profit as a new database would offer new ways to look at this key variable: rate of profit.

We chose to investigate the United States and China in this paper. First, the United States and China are the two largest capitalist economies, the two most important economies to understand contemporary capitalism—China is the second largest GDP in current US dollars and since 2013 the largest GDP in PPP (World Bank 2019). Second, global capitalism is currently undergoing huge geopolitical changes, whose final outcome is not easy to predict, and China is seen by many as a prime candidate as the next hegemonic country (Arrighi 2007). Third, especially in these phases of geopolitical change, the investigation of alterations in the rate of profit in different countries may show how a falling rate of profit in one leading country may be synchronic to a rising rate of profit in another country—differences that shape international movements of capital. Therefore, an investigation of the comparative trajectories of the rate of profit in China and in the United States would help to understand changes that may be taking place in the global scenario.

The time span of these data is limited—only 8 years—but during this period between 2007 and 2014, there have been crises and structural changes both in the United States and in China.

The 2007–2008 crisis affected the United States and China differently. The disparity between the pace of the United States and other advanced economies and of China and other emerging economies has persisted before, during, and after the crisis: China and other emerging economies obtained higher growth rates until 2007, the decline in those rates was lower in emerging economies in 2008, and they returned to precrisis level more quickly (Bank for International Settlements 2013: 6). China managed the crisis of 2007–2008 in a way that suggests an uneven pattern between its dynamics and the dynamics in the United States, probably causing a delayed effect (Bank for International Settlements 2014: 43, 2015: 45).

Structural changes took place in both economies from 2007 to 2014. In the United States, as a consequence of the rise of new sectors within the information and communication sector: for example, in 2009, Google joined the list of Fortune Global 500 (in the 423rd position), and it grew and rose quickly to the 162nd position by 2014. In the case of China, there were both

changes in sectors and changes in size: in 2007, there were only 28 firms in the Fortune Global 500 and, in 2014, there were 94. The differences between the two countries regarding their growth are summarized by a comparison between their GDPs (2010 US$) according to the World Bank: in 2007, China's GDP was US$4.59 trillion, growing almost 80 percent to US$8.32 trillion in 2014, while the United States showed a smaller growth, 8 percent, from US$15 trillion in 2007 to US$16.2 trillion in 2014 (World Bank 2019).

This paper investigates the rate of profit for two key capitalist economies, for the period between 2007 and 2014, organizing empirical descriptions of its behavior. The empirical description of those data is organized to help the understanding of three issues that are part of debates in the literature on profits and their different distributions by industry, sectors, and countries. First, the trajectories of the national average rate of profit for the United States and for China, and the disaggregation of those averages by economic and manufacturing sectors of those two countries. Second, a comparison between the distribution of different rates of profit by firms, economic sectors, and manufacturing sectors in those two economies. Third, a preliminary investigation, within the limits of the eight year time span, of the stability of those distributions over time.

To organize these investigations, this paper is divided into seven sections. The next section presents a focused literature review. The third section describes our database and discusses methodological issues. The fourth shows the trajectories of the average national rate of profit in the United States and in China, and their disaggregation by economic and manufacturing sector. The fifth compares the distribution of profits in these two countries. The sixth evaluates the stability of these distributions over time. The last section summarizes the main findings, discusses the limits of those findings, and suggests an agenda for further research.

2. Literature Review

Developing a theoretical background to investigate the profit rate, its movements, and its differentiation is certainly a challenging issue. We are aware of the dimension of this matter, and each of us has dealt with associated topics in previous works (Marquetti et al. 2018; Ribeiro et al. 2017a). When we investigate the complexity of one national average rate of profit, we find a large volume of empirical literature dealing with differentiation of rates of profit within and between different economic and manufacturing sectors.

Marx (1894), in his examples on the transformation of surplus-value into profit, always deals with different "capitals"—for him sometimes different enterprises, different businesses, or we could say different firms, since firms may be seen as the "locus of capital accumulation" (Guimarães 1982).[1] For Marx, the permanent drive to produce under better technological conditions—a precondition for *surplus profit* (Marx 1894: 300) or *extra surplus* (Marx 1867: 436) or *extra profit* (Marx 1894: 367)—would be a permanent source of differentiation of rates of profit between different capitals (or firms).

In his treatises, Marx might have had insights along the line of Bain's barriers to entry (Bain 1956), as he put forth in the third volume of *Capital* that "certain spheres of production are in a position to opt out the transformation of their commodity values into prices of production, and the consequent reduction of their profit to the average profit" (Marx 1894: 301). Marx would also speculate that an evolution of the credit system would strengthen that position: the development of share capital (Marx 1894: 347 and 568).

[1] Marx uses the term "enterprise" in volume three, Part 5, especially in chapters 23 and 27. In chapter 23, Marx discusses topics such as supervision, management, and the separation between "managerial work" and the "possession of capital"—topics of modern theories of the firm. He also uses "business" (Marx 1894), possibly as another synonym for firm.

Metamorphosis of capitalism in the end of the 19th century led to the emergence of the dominant position of large corporations (another transformation of the credit system), as described by Hilferding (1910) for Germany and Chandler (1977) for the United States. This rise of great corporations has a correspondent transformation of market structures with oligopoly becoming the most common market structure in leading capitalist economies. Those transformations generalized the exception mentioned by Marx.

Following Schumpeter's suggestions of the transformation of the nature of competition in capitalism (Schumpeter 1942), in particular the role of competitive pressures generated by potential entrants, Bain (1951, 1956) opens a line of inquiry in this subject and Schmalensee (1989) and Scherer and Ross (1990) organize broad reviews of this line of inquiry, amassing empirical evidence on the intra- and interindustry differences on rates of profit, confirming how systematic and persistent those differences are.[2] However, the emergence of large multiplant and multiproduct firms does not mean that the competition had declined, rather that large financial resources have allowed them to move to different sectors and countries (Semmler 1981).

2.1. Capitalist competition and differentiation of rates of profit

The understanding of the role of competition in capitalist economy has as a starting point Marx's theory on the dynamic changes triggered by the drive to produce in better technological conditions. According to Marx, each capitalist has a motive to "cheapen his commodities by increasing the productivity of labor" (1867: 435). This increase in productivity would allow him to produce his commodities with individual values below the market level, establishing what Rubin (1926: 174) considers the "prime mover of technical progress in capitalist society."

Capitals, or firms, with improved methods of production capture an "extra surplus value" (1867: 436). This drive to generate extra profit, or surplus profit, was later reworked by Schumpeter as the profit that arises from innovation (1911: ch. 2) and is seen as a key driver for large and dynamic contemporary firms to capture "sustained above-average profitability" (Teece 2010: 722).

Each capitalist, or each firm, has a permanent drive to achieve this extra surplus—a permanent source of imbalance in capitalist dynamics. However, as Marx goes on, this extra surplus value "vanishes as soon as the new method of production is generalized" (1867: 436). This process, creation and erosion of extra surplus profits, has "an immanent drive, a constant tendency, towards increasing the productivity of labor, in order to cheapen commodities" (1867: 436–437). Therefore, the rates of profit of specific capitals or enterprises or firms are in constant transformation. This can be a very basic factor of the microeconomics of technical change and profit differentiation.

But this process is more complicated because in capitalist competition there are firms unable to absorb those new production processes: firms that will go bankrupt. Firms may not survive, firms may go under, and firms may leave the market. Those firms that die leave market shares to the leading firms, which may then grow, conquering new markets.

So, competition for Marx, "fought by the cheapening of commodities," through the productivity of labor, involves the scale of production, meaning that "the larger capitals beat the smaller" (1867: 777). In Marx's summary, competition "always ends in the ruin of many small capitalists, whose capitals partly pass into the hands of their conquerors, and partly vanish completely" (1867: 777).

This very concise summary of Marx's view of competition shows how nothing is stationary in capitalism: the value of commodities changes, productivity of labor changes, extra surplus is

[2]Shaikh (2016) uses data from Bain and Scherer to identify "empirical evidences on profit rates and monopoly power."

created and vanishes, firms capture extra-surplus and firms imitate to survive, some firms die and others grow conquering new market shares.

But, in a broader view of the system (volume 3, part 3), Marx mentions the creation of "new branches of production" (1894: 344), "an increasing diversity of branches of production" (1894: 375). Marx's discussion of the creation of "new branches of production" is within his view of "counteracting factors" against the fall of the rate of profit. In those new branches of production, the competitive process would be repeated again and again, composing his general view of the accumulation process, where centralization and concentration of capital are dynamic features that create asymmetry and difference in sizes of capitals and firms, in an endless process where institutions like the credit system act as weapons for the centralization of capitals. Again, the capitalist process, an expansionary process, leads to a differentiation in the number, size, and production capabilities of firms that are translated in different capabilities of profit generation—thus, differentiation in rates of profit.

2.2. From firms to the behavior of a national average rate of profit: An emergent process

We believe that the nature of competition in a capitalist society leads to a nonstatic and out-of-equilibrium situation from Marx's point of view. Capitals, or firms, struggle to gain extra profits introducing technological changes. Therefore, one feature of capitalism is the permanent drive for leading firms (or aspiring leading firms) to introduce technical change to capture higher rates of profit vis-à-vis their competitors, a dynamic process that produces sectoral differentiation in the rates of profit. From the point of view of the development of the temporal single system, Borges Neto evaluates that "within each sub-sector, with the production structured by different capitals producing commodities with individual values above or below market values, means that inequality of profit rates reigns" (Borges and João 1997). This approach stresses how capitalist competition creates unequal rates of profit—capitalist competition is a permanent de-equalizing and destabilizing force (78).

This differentiation of rates of profit among firms in the same sector is an evidence empirically identified by Bain (1951, 1956). Later, a huge body of empirical literature on this subject was developed, with the main findings being reviewed by Schmalensee (1989) and Scherer and Ross (1990). This differentiation was theoretically developed in the literature on oligopoly (Labini 1956; Steindl 1952).

What are the connections among different rates of profit at the firm level and national average rate of profit? One answer starts with Marx's view, discussed previously in this section, that a capitalist economy is not a system in equilibrium. A capitalist economy is an ever-changing system, inter alia by the permanent creation of new capitals—new firms—remember Marx's "transformation of money in capital" (1867: ch. 4), where there are capitalists in *"larval form*," money owners, forming an environment described by Marx as being repeated every day—and new branches of production. Therefore, a system with new firms, new industries, new branches of production whose creation may destroy or reshape existing firms and sectors—a dynamic process that Schumpeter (1942) in a chapter with an explicit reference to Marx calls "process of creative destruction."

The behavior of the national average rate of profit emerges from the interaction among firms—competition and cooperation (Richardson 1972), form different layers that interact to create this national average rate of profit. This national average can be calculated, as Duménil and Lévy (2015) do for the United States.[3]

[3] Duménil and Lévy (1993) and Basu and Vasudevan (2013) are investigations on long-term behavior of the rate of profit.

Under those national averages, there is the turbulent behavior of rates of profit, as at each of those different layers (firms, sectors), the rates of profit change all the time. This turbulent behavior, out-of-equilibrium, is a subject of investigation, as it organizes the system: a complex system is self-organized. A modern capitalist system may be described as a complex system, as it is an open system. It is a system whose basic units are also complex systems, where human beings interact to form firms, institutions, governments, a system whose number of components may change, where each agent can change—enter, grow, and/or exit the system (Ribeiro et al. 2017a: 288).

2.3. The distribution of different rates of profit: Shape and stability

Differences in rates of profit constitute an empirical regularity, formally expressed by the broad and careful revision organized by Schmalensee (1989: 969–987): section 5 of that revision "describes studies that attempt to explain differences in profitability" (953). Those different rates of profit are the outcome of tough competition even within oligopolies, another empirical regularity described by Scherer and Ross (1990): turbulence—turnover—among the leading firms of oligopolies. Cohen (2010) reviews more recent literature that connects the ability to generate and to appropriate profits to the innovative capabilities of large firms through multiple channels.

Those empirical regularities are so accepted that they open a specific branch of the literature, both empirical and theoretical, to investigate the shape and properties of the statistical distributions of those different rates of profit. At least three different approaches investigate this distribution. First, industrial organization: Bain, Schmalensee and Scherer and Ross identify those differences and try to understand them through the lens of industry structural characteristics, especially market power and concentration.[4] Second, discussions on theoretical predictions of competitive markets: Mueller (1990) investigates how the persistence of different rates of profit challenges those predictions. Third, political economy: Farjoun and Machover (1983), Wells (2007), Botwinick (2017), and Scharfenaker and Simieniuk (2017), assuming different rates of profit, investigate their distribution and the stability of those distributions over time.

In common as this may be one starting point for our analysis, all three approaches identify systematic differences in rates of profit at the firm and sectoral level. The political economy approach explores an important issue related to the shape and stability of those distributions. Botwinick (2017: 159) stresses how capitalism means a "continued re-differentiation of profit rates." Farjoun and Machover (1983), using a theoretical framework of thermodynamics, have a pioneering work suggesting that profit is a random variable and that it has a gamma distribution. Furthermore, in line with their interpretation inspired in thermodynamics, they suggest that this distribution is stable over time. Shaikh (2016), assuming interindustry and intraindustry differences in rates of profit, evaluates that "equalization tendencies are the basis of stable distributions of wage and profit rates" (749). Scharfenaker and Simieniuk (2017) review the works of Farjoun and Machover (1983), using a database from 24,000 public listed firms in the United States and find a "Laplace distribution" of those different rates of profit, a distribution that "shows strong time invariance qualities consistent with the statistical equilibrium hypothesis" (2017: 491).

There is a new line of research that suggests that a modern capitalist economy might be described as a complex system (Arthur 1999). This line of research is based on evidences that in

[4] Variability of profit rates is a topic of Schmalensee (1989: 985–987).

a capitalist economy everything changes all the time, one finds the entry and exit of individuals, firms, and institutions, and the laws regulating the system change over time—crises may be moments of change. This hypothesis leads to another conjecture, for complex systems, according to Goldenfeld and Kadanoff (1999), "their probability distributions are rarely normal."

This literature review provides the theoretical and empirical orientation that organizes our exploration of the ORBIS database. This new database may contribute to the investigation those three issues presented in the introduction with a new observational point of view. The matching of our data and their statistical description with those three research questions is the main goal of this paper.

3. Data and Methodology

This paper uses a database on firms and institutions: ORBIS, organized by the Bureau van Dijk Electronic Publishing (BvD) (http://www.bvdinfo.com/en-gb/home). Since it organizes information on firms, their structure, and financial data for different countries, we can explore some comparability among data for different countries.[5]

ORBIS presents its information according to the Statistical Classification of Economic Activities in the European Community, referred to as NACE. NACE is the classification of economic activities developed by the European statistical system (European Commission 2008). This paper employs the NACE two-digit classification.

The profit rate is a ratio between a flow variable, profits, and a stock variable, capital. ORBIS presents data on return on assets (ROA) using net income, employment, and total assets.[6] Our measure of profit is the net income. It is computed as the total revenues minus total costs, including depreciation, debt service, taxes, and other expenses. The total assets at historical costs are our measure of capital stock. The profit rate, r, is measured as ROA using net income:

$$r = \text{Net Income} / \text{Total Assets}. \quad (1)$$

Since the data set presents the number of employees, N, it is possible to decompose our measure of the profit rate as:

$$r = (\text{Net Income} / N) / (\text{Total Assets} / N). \quad (2)$$

The first ratio informs us about the profit per employee,[7] while the second one informs us about the amount of capital per employee. The profit rate increases with profit per person and decreases

[5] For a description and discussion of ORBIS database, see Kalemli-Özcan et al. (2015).

[6] There are other options in the Orbis database: ROA using p/L before tax and Profit Margin. Our option for ROA using Net Income is based on its similarity to the concept used by the literature on rate of profit.

[7] There are different ways to decompose the profit rate. Considering that the product, X, is the sum between wage, W, and profits, Z, we have:
$X = W + Z$,
Dividing by the number of workers, N, we see that labor productivity, x, is the sum between average wage, w,and profit per worker, z:
$x = w + z$.
We can write:
$z = x - w$.
Dividing the above expression by the capital-labor ratio, k, we obtain:
$z / k = (x - w) / kr = (x - w) / k = [(x - w) / x] / k / x = (z / x) * (x / k) = \pi \rho$
where r is the rate of profit, π represents the profit share and ρ the productivity of capital. Profit share is a proxy for income distribution and capital productivity for technical change. However, due to the information in this text we use the following disaggregation:

with the amount of capital per person. Cost reduction is a central aspect of the competition among firms. It is obtained by increasing labor productivity and the scale of production. The process of competition drives the firms to expand the scale of production raising the total assets per worker in order to increase the profit per worker. The movement of the profit rate depends, inter alia, on the balance between these contradictory forces.

The database covers data from 2007 to 2015. There is information on 18,347 firms for the United States and 629,176 firms for China, reflecting the role of new and small firms in Chinese transition toward market economy and the fact that the United States economy is more consolidated than the Chinese economy at this stage.[8]

An indication of how representative ORBIS is vis-à-vis the United States' and China's economies may be grasped by two comparisons. In the United States' case, data from the Bureau of Economic Statistics (2018) show that the total value added for the manufacturing sector in 2014 was US$2.111 trillion and its Gross Output was US$6.098 trillion, while our data from ORBIS for total revenue of manufacturing sector was US$1.585 trillion in 2014. In the case of China, data from the National Bureau of Statistics of China (2018) show for 2014 a total of 377,888 firms in the industrial sector, while our data from ORBIS show 314,120 firms in the manufacturing sector. These comparisons inform how representative our data from ORBIS are, suggesting a reasonable level of coverage, sufficient for an introductory analysis yet demanding caution in preliminary conclusions.

A compatibilization between ORBIS and a well-known series of rates of profit, such as those prepared by Duménil and Lévy (2015), was explored in a previous paper (Ribeiro and da Motta e Albuquerque 2016). Although they used different sources of data, the direction and shape of movements in the rate of profit for the United States were similar for the overlapping years in both datasets (569 and 571), a finding that stimulated the explorations organized in this paper.

Those general data are the starting points for appendix table A1. ORBIS database displays differences in the coverage of those firms. Appendix table A1 shows the coverage for data related to rate of profit, more specifically, the total of firms with information about ROA, using Net Income in the ORBIS database. As shown in appendix table A1, the coverage for the United States is broader than for China: 66 percent × 23 percent for 2007, and 90 percent × 53 percent for 2014. Those differences might again be an expression of the different levels of consolidation of both economies, because it is easier to find data for large consolidated groups than for new small companies. Appendix table A1 also provides the background for our decision to use data from 2007 to 2014. This is a limited time span, defined by data constraints, but it is enough for a preliminary and exploratory comparative analysis of those two leading capitalist economies.

4. National Average Rates of Profit in the United States and in China: Trajectories and Their Disaggregation

This section first describes the behavior of average rates of profit for United States and China and then breaks them down by economic and manufacturing sectors.[9]

$x - w = z$,

as $z = r\,k$ we can write:

$r = z / k$

The rate of profit is theratio between profit per worker and the capital-labor ratio.

[8]Naughton (1995: 227 and 313–315) describes the entry of new and small firms as an important feature of the economic transformation in China after 1978. The role of small firms is an important structural feature in later periods of Chinese development (Naughton 2007: 303–304).

[9]Intersectoral differences in rates of profit are a regularity found in studies of industrial organization, mainly focused in the United States (Schmalensee 1989: section 5). For China, those differences are described by Naughton (1995: 238), for 1980 and 1989.

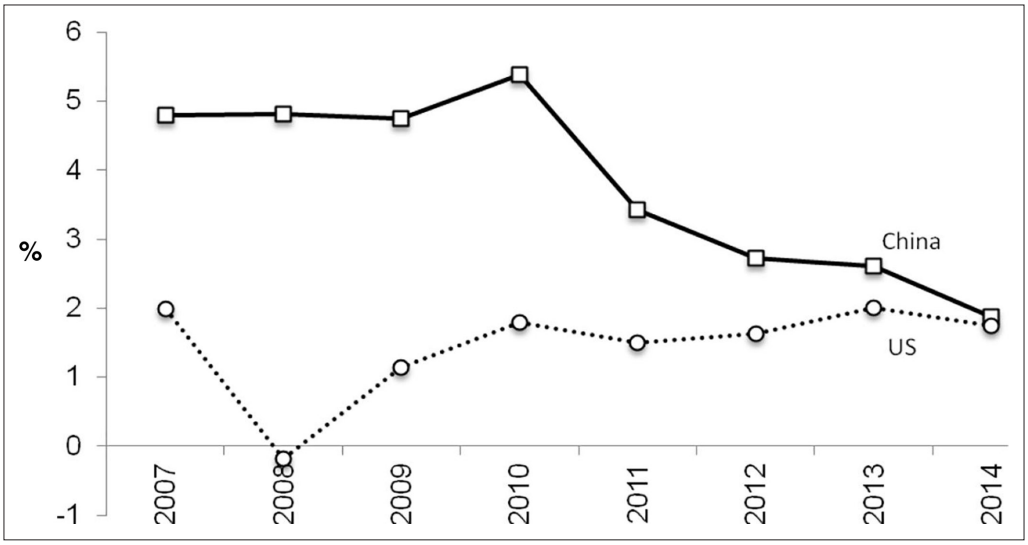

Figure 1. Average rate of profit—return on assets using Net Income—China and USA (2007–2014).

Source: ORBIS, authors' elaboration.

4.1. Trajectories of national average rates of profit

Figure 1 shows the movements of the average rate of profit for China and the United States between 2007 and 2014.[10] The profit rate in China is higher than in the United States economy over the period of study. However, there was a decline in profitability of the Chinese firms to a level correspondent to that of the United States' firms in 2014. The profit rate in China in 2014 corresponds to 39.2 percent of its value in 2007. In the United States, the profit rate fell sharply with the 2008 crisis, recovering to a level close to 2007 in the following years.

The path of our measured profit rates for China and the United States is very similar to the movements of the profit rate calculated by Li (2017) for the same countries. His results also show a rapid drop in the Chinese profit rate after 2010 to a level correspondent to the United States economy in 2014. Li (2017) employed data from the National Bureau of Statistics for China and the Bureau of Economic Analysis for the United States.

It is important to stress the higher level of average rates of profit for China, except for 2014.[11] This is consistent with broad movements of capital in direction of China that in 2014 became the "largest recipient of FDI in the world" (UNCTAD 2015: 41). This is also important for a more general discussion of the profit rate in the world scenario, because if we focus only on one country, even if that country is a leading country like the United States, we may get only part of the picture, because a contraction in the rate of profit in one country might be synchronic with an expansion of profits elsewhere. A cautionary note must be taken here, given the limited time span of our data: we cannot foresee how the rate of profit in China will behave in the next years—it may rebound and resume growth, it may replicate the ups and downs of the rate of profit in the United States, or it may resume a higher level of rate of profit vis-à-vis the United States.

Figure 2 displays the profit per employee measured in current dollars for China and the United States between 2007 and 2014—see the first term at the right side of equation (2). While the profits per employee increased 303 percent in China during this period, in the United States they expanded only 42 percent.

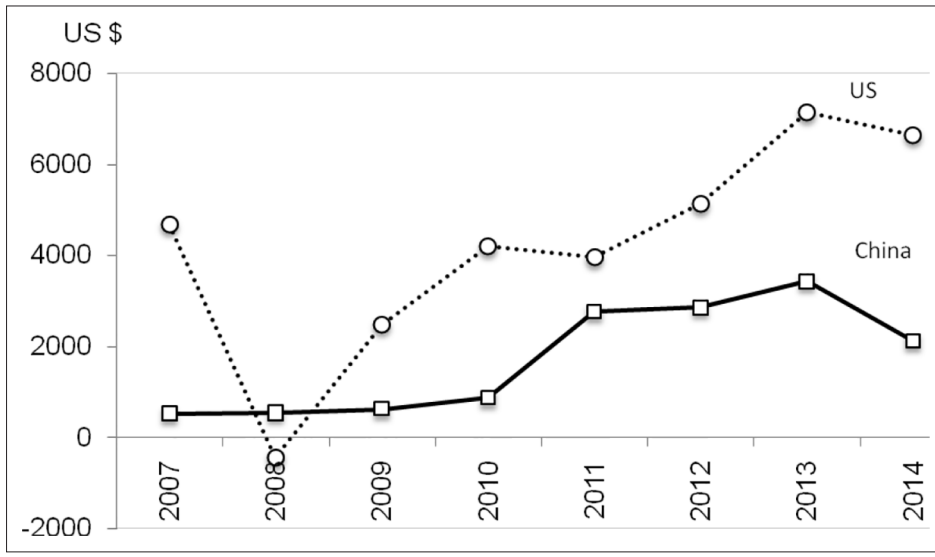

Figure 2. Profits per employee, China and USA (2007–2014).

Source: ORBIS, authors' elaboration.

Figure 3 shows the capital assets by employee for China and United States in the period of study—see the second term at the right side of equation (2). The capital assets per worker in the Chinese firms expanded 927 percent between 2007 and 2014, while in the United States firms they rose 61 percent.

Those two movements, shown in figures 2 and 3, might be related to the growth of Chinese economy between 2007 and 2014, a pattern of growth that is related to the increase in the size of their corporations.[12]

4.2. Intersectoral differences in the rate of profit

To compare the intersectoral behavior of the rate of profit with the national averages shown in figure 1, it is important to mention that in tables 1 and 2 the averages are calculated from the sectoral average rates of profit. This explains why the line "Mean (*M*)" in both tables is not equal to the average rate of profit shown in figure 1: because for figure 1 the rate of profit was calculated in an aggregated form for the whole economy.

Furthermore, this subsection looks at sectors A to N (NACE sectors) (tables 1 and 2). This focus follows a classification suggested by the International Labor Organization (International Labor Organization 2018a; 2018b) that presents NACE sectors O, P, Q, R, S, T, and U as

[12] Appendix Table A2 shows evidence in this regard: China as a less consolidated industrial and economic structure, with a large set of small firms (with assets below US$25 million)—126,421 in 2007 and 308,293 in 2014. Structural change in terms of the size of firms is captured by Appendix Table A2, as the total of larger firms (with assets above US$1 billion) grows from 596 firms in 2007 to 2,485 in 2014. In the case of China, there was a negative relationship between the size of the firms and their profit rates. Smaller firms displayed higher rates of profit than larger firms. It may suggest a large difference between the total assets per worker among Chinese firms than in the case of the United States. The leading sector in terms of profit is in the range between US$25 and 50 million, which led between 2007 and 2013, while in 2014 the range between US$50and 100 million had the highest average.

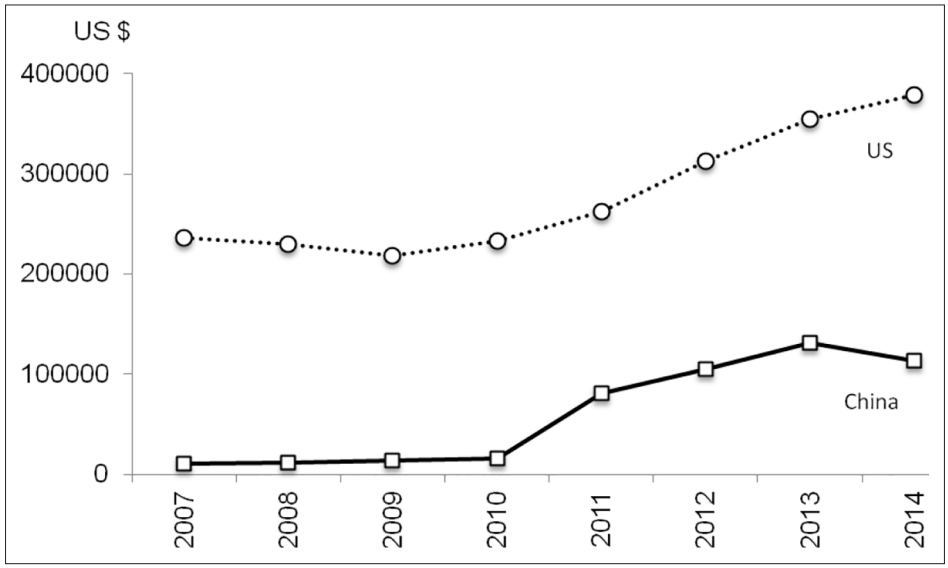

Figure 3. Capital assets per employee, China and USA (2007–2014).

Source: ORBIS, authors' elaboration.

"nonmarket services."[13] while service sectors G, H, I, J, K, L, M, and N are "market services"—see correspondence table (International Labor Organization 2018b: 2). Accordingly, the means, standard deviations, and coefficients of variation are calculated for sectors A to N (NACE sectors).

Table 1, data for United States firms, shows systematic differences and changes in the rate of profit by sector and over time.

The ranking of profitability for United States firms changes, according to economic sectors between 2007 and 2014. In 2007 the highest rate of profit was in "mining and quarrying" (NACE B), a sector that fell to the lowest rate of profit in 2014. In 2014 the highest rate of profit was "construction" (NACE F).

Table 1 shows differences in the coefficients of variation, highlighted by the highest coefficient of variation in 2008 (13.04)—in that year, there is also the greatest standard deviation (6.74), influenced by the negative profit of "construction" (NACE F), a sector at the center of the crisis. An additional six sectors also had negative profits in 2008. Those data combine with the lowest mean of the rate of profit in that year (0.52) to define the highest coefficient of variation. The effects of the crisis in 2007 and 2008 might be behind the higher intersectoral coefficient of variation between 2008 and 2011. The divergence in the sectoral rates of profit is reduced over time and, in 2014, this indicator is lower than in 2007.

Table 1 also shows oscillation of all sectoral rates of profit. The larger mean is for "manufacturing" (NACE C): 7.47 percent. "Manufacturing," together with "wholesale and retail trade…" (NACE G) have the lowest coefficient of variation (0.18) among all sectors. "Construction" (NACE F) has the highest coefficient of variation (5.23)—again, an expression of the impact of the crisis on this sector. Those differences in all variables, summarized in the differences in the

[13] "Nonmarket services" NACE sectors: Public Administration and Defense, Compulsory Social Security (O), Education (P), Human Health and Social Work Activities (Q), Arts, entertainment and recreation, (R) and Other services (S).

Table 1. United States, rate of profit—return on assets (ROA) using Net Income—by economic sectors (NACE classification), standard deviation, mean, and coefficient of variation (2007–2014)

	US—ROA using Net Income										
	2007	2008	2009	2010	2011	2012	2013	2014	Standard deviation (SD)	Mean (*M*)	Coefficient of variation (*SD*/*M*)
A—Agriculture, forestry, and fishing	4.43	18.18	8.27	6.62	7.11	9.14	4.58	6.61	4.37	6.87	0.64
B—Mining and quarrying	12.08	4.78	8.71	10.10	8.20	2.97	4.05	0.92	3.86	6.49	0.60
C—Manufacturing	6.93	5.15	4.42	7.60	7.34	7.86	7.86	7.72	1.33	7.47	0.18
D—Electricity, gas, steam, and air conditioning	3.48	2.22	2.87	2.63	2.67	1.87	2.38	2.11	0.50	2.51	0.20
E—Water supply; sewerage, waste management	2.37	2.88	1.53	1.57	−0.23	2.00	2.02	4.58	1.36	2.01	0.67
F—Construction	5.60	−12.55	−15.63	−1.52	−7.71	8.79	12.13	8.80	10.67	2.04	5.23
G—Wholesale and retail trade; repair of motor	6.22	3.09	4.88	5.89	5.36	5.50	5.80	5.17	0.96	5.43	0.18
H—Transportation and storage	4.64	−2.78	0.21	2.77	2.72	1.13	3.13	5.18	2.57	2.75	0.94
I—Accommodation and food service activities	5.53	1.48	1.00	0.00	9.89	2.84	1.98	2.38	3.17	2.18	1.46
J—Information and communication	0.30	−1.03	3.77	5.09	4.69	5.19	6.01	4.95	2.56	4.82	0.53
K—Financial and insurance activities	1.73	−0.44	0.82	1.39	1.05	1.31	1.66	1.45	0.70	1.35	0.52
L—Real estate activities	6.14	−1.28	−6.35	0.23	2.04	2.00	2.61	3.40	3.71	2.02	1.84
M—Professional, scientific, and technical activities	1.47	−2.14	2.46	5.23	5.46	2.72	7.07	5.29	2.94	3.98	0.74
N—Administrative and support service activities	1.88	−4.93	0.08	0.50	1.69	0.87	1.34	0.94	2.19	0.91	2.42
Standard deviation (*SD*)	3.02	6.74	6.10	3.37	4.40	2.90	3.05	2.49			
Mean (*M*)	4.53	0.52	1.99	2.70	3.71	2.78	3.59	4.76			
Coefficient of variation (*SD*/*M*)	0.67	13.04	3.06	1.25	1.19	1.04	0.85	0.52			

Source: ORBIS, authors' elaboration.

Table 2. China, rate of profit—return on assets (ROA) using Net Income—by economic sectors (NACE classification), standard deviation, mean, and coefficient of variation (2007–2014)

	China—ROA using Net Income										
	2007	2008	2009	2010	2011	2012	2013	2014	Standard deviation (*SD*)	Mean (*M*)	Coefficient of variation (*SD*/*M*)
A—Agriculture, forestry, and fishing	4.11	6.23	3.68	2.76	5.48	5.59	2.71	2.19	1.52	3.90	0.39
B—Mining and quarrying	14.67	14.05	8.17	10.22	10.87	8.30	7.79	4.02	3.49	9.26	0.38
C—Manufacturing	6.17	5.10	6.00	6.79	6.16	5.24	5.51	4.09	0.83	5.76	0.14
D—Electricity, gas, steam, and air conditioning	3.36	0.61	1.18	2.02	1.96	2.31	2.78	2.49	0.87	2.16	0.40
E—Water supply; sewerage, waste management	1.60	1.47	1.43	2.12	3.04	2.70	2.62	3.64	0.81	2.37	0.34
F—Construction	2.87	2.23	2.66	2.60	2.66	2.23	2.29	2.16	0.27	2.45	0.11
G—Wholesale and retail trade; repair of motor	3.93	3.15	3.24	4.20	4.61	3.57	4.04	2.74	0.62	3.75	0.17
H—Transportation and storage	7.47	1.93	1.96	5.43	2.83	2.17	1.63	1.84	2.13	2.07	1.03
I—Accommodation and food service activities	4.45	3.17	3.67	4.04	3.53	3.14	1.30	0.50	1.37	3.35	0.41
J—Information and communication	4.48	0.62	3.13	2.49	6.16	4.96	4.33	4.19	1.69	4.26	0.40
K—Financial and insurance activities	2.89	0.82	1.97	1.95	1.19	1.23	1.21	1.19	0.67	1.22	0.55
L—Real estate activities	4.63	3.37	3.55	3.43	3.63	3.62	3.00	2.34	0.64	3.49	0.18
M—Professional, scientific, and technical activities	3.10	2.81	2.92	3.62	4.42	3.49	3.20	4.33	0.61	3.34	0.18
N—Administrative and support service activities	5.49	4.84	6.13	6.91	6.61	4.57	3.64	2.18	1.59	5.16	0.31
Standard deviation (*SD*)	3.17	3.46	1.97	2.39	2.46	1.82	1.76	1.19			
Mean (*M*)	4.28	2.98	3.19	3.52	4.03	3.53	2.89	2.41			
Coefficient of variation (*SD*/*M*)	0.74	1.16	0.62	0.68	0.61	0.52	0.61	0.49			

Source: ORBIS, authors' elaboration.

coefficients of variation, express the sustained differences in sectoral rates of profit over time for the United States.

Table 2, data for Chinese economic sectors, also shows systematic differences and changes in the rate of profit by sector and over time.

There is no stability in the rates of profit over time in China, as table 2 shows oscillation of all sectoral rates of profit, reflecting changes in the rankings. In 2007, the highest rate of profit was "mining and quarrying" (NACE B)—as in the United States—and, in 2014, the highest rate of profit was in "professional, scientific and technical activities" (NACE M), followed by "information and communication" (NACE J), and by "manufacturing" (NACE C). Those changes might hint the nature of fast growth and structural change in the Chinese economy.

Table 2 shows that the highest coefficient of variation in China is also in 2008 (1.16). As in the United States, for China the coefficient of variation for 2014 is lower than in 2007. Comparing the means, China has higher average rates of profit between 2008 and 2012. The dispersion of rates of profit seems to be lower in China, as a comparison between the coefficients of variation of China and United States may suggest: table 2 shows that in China they are greater than 0.50 only in two NACE sectors, while table 1 shows that in the United States 11 NACE sectors have coefficients of variation greater than 0.50.[14]

Tables 1 and 2 show important differences, both intersectorally and intertemporally. But, in two key sectors—C (Manufacturing) and J (Information and Communication)—they show a common behavior. Manufacturing, in both countries, has higher rates of profit than the overall mean in all years between 2007 and 2014. Information and Communication, in both countries, has rates of profit that were not above the general mean in the initial years, but were above it in the final years—after 2009 in the United States and after 2011 in China.

There is another important point regarding those two sectors—NACE C (Manufacturing) and NACE J (Information and Communication)—their behavior is different from the national averages. As figure 1 shows, the Chinese rate of profit was above the rate from United States in all years, becoming similar only in 2014. However, a comparison between tables 1 and 2 shows a different comparative behavior for those two key sectors: for NACE sector C (Manufacturing) the United States has a higher rate of profit in all years except 2009, and for NACE sector J (Information and Communication) the United States has higher rates of profit in all years, except 2007, 2008, and 2011.

The behavior of sectoral rates of profit is influenced by specific economic conjunctures. In the years of crisis, the rates of profit go down—in 2008 and 2009 they are lower than before (2007) and after (2010) both in United States and China. However, the intensity of the impact of the 2007–2008 crisis is different, as in 2008 and 2009 the mean for China was between 2.98 percent and 3.19 percent and for the United States between .52 percent and 1.99 percent.

The impact of the crisis in 2008 and 2009 shows other differences. In the United States, according to table 1, there are sectors with losses (negative profits): "financial services" (NACE K) in 2008, "real estate" (NACE L) in 2008 and 2009, and "construction" (NACE F) between 2008 and 2011. On the other hand, in China, according to table 2, there is not a single sector with negative profits between 2007 and 2014.

The different economic rhythms mentioned earlier are reflected in the movements of the rates of profit. In China, the biggest drop takes place after 2012, reaching 2.41 percent in 2014—the lowest mean in table 2. The United States presents a different pattern, since there was an expansion in the profitability in 2013, reaching 4.76 percent in 2014—the highest in table 1. Table 1

[14]Naughton (1995: 239) shows the decline in the coefficient of variation (in manufacturing and mining) from 0.77 in 1980 to 0.37 in 1989. Between 1980 and 1989 the profitability declined in all sectors with high profitability in 1980 (Naughton, 1995: 237).

also shows for 2014 a mean (4.76 percent) greater than the mean for 2007 (4.53 percent), and half of all sectors had in 2014 a profit rate higher than its 2007 level.

Comparing 2011 and 2014, there is a common pattern of reduction in the coefficients of variation both for United States and China. However, the movement of changes in the means of rates of profit was different: an increase since 2012 in the United States and a decrease since 2011 in China.

4.3. A closer look at manufacturing (NACE C)

Disaggregating by manufacturing sector (12 NACE subsectors), we may investigate intrasectoral differences in the average rate of profit shown in tables 1 and 2. As mentioned in the previous subsection, the average rate of profit of NACE sector C (Manufacturing) was greater than the general mean in all years between 2007 and 2014.

Table 3, data for United States manufacturing firms, presents systematic differences and changes in the rate of profit by subsector and over time.

In 2007, the highest rates of profit were in "manufacture of rubber and plastics products, and other nonmetallic mineral products" (NACE CG), followed by "manufacture of pharmaceuticals, medicinal chemical and botanical products" (NACE CF) and "manufacture of basic metals and fabricated metal products, except machinery and equipment" (NACE CH). In 2014, this ranking was different, with "manufacture of computer, electronic and optical products" (NACE CI) showing the highest rate of profit, followed by "manufacture of pharmaceuticals, medicinal chemical and botanical products" (NACE CF) and "manufacture of food products, beverages and tobacco products" (NACE CA). It is important to note the position of the subsector "manufacture of pharmaceuticals, medicinal chemical and botanical products" (NACE CF), which achieved rates of profit greater than 10.00 percent in 5 out of 8 years shown in table 3.

Table 3 reveals the persistence and changes of intrasectoral differences in rates of profit. The changes in the coefficients of variation express those phenomena. Also, in the manufacturing sector the variability between sectoral average rates of profit increased during crisis, as the figures for 2008, 2009, and 2010 show (0.91, 1.87 and 1. 45, respectively).

Table 3 shows intertemporal differences in the rates of profit, with oscillation of the rate of profit in all manufacturing sectors, reflecting changes in their rankings. The highest overall mean was for "manufacture of computer, electronic and optical products" (NACE CI) (10.69 percent), followed by "Manufacture of pharmaceuticals, medicinal chemical and botanical products" (NACE CF) (10.08 percent). Both means are greater than the mean for "manufacturing" in table 1 (7.55 percent), which was the highest among sectors A to N—important evidence on the differences within sectors and industries, suggesting directions of structural change within a national economy.

Table 4, data for Chinese manufacturing firms, also reveals systematic differences and changes in the rate of profit by subsector and over time.

In 2007, the highest rates of profit were in "manufacture of food products, beverages and tobacco products" (NACE CA), followed by "other manufacturing, and repair and installation of machinery and equipment" (NACE CM) and "manufacture of basic metals and fabricated metal products, except machinery and equipment" (NACE CH). In 2014, this ranking was different, with "manufacture of transport equipment" (NACE CL) showing the highest rate of profit, followed by "manufacture of pharmaceuticals, medicinal chemical and botanical products" (NACE CF) and "manufacture of food products, beverages and tobacco products" (NACE CA) (the second and third position in 2014 are the same subsectors as in the United States).

Table 3. United States, rate of profit—return on assets (ROA) using Net Income—by manufacturing sectors (NACE classification), standard deviation, mean, and coefficient of variation (2007–2014)

	2007	2008	2009	2010	2011	2012	2013	2014	Standard deviation (*SD*)	Mean (*M*)	Coefficient of variation (*SD*/*M*)
CA—Food products, beverages, and tob	7.66	7.67	8.35	8.68	10.54	9.63	11.60	8.96	1.39	8.82	0.16
CB—Textiles, apparel, leather	4.92	4.25	−1.29	5.50	5.40	5.06	9.46	7.32	3.06	5.23	0.59
CD—Coke and refined petroleum	2.92	4.26	−1.08	−6.14	4.24	18.83	10.83	7.11	7.52	4.25	1.77
CE—Chemicals and chemical products	6.38	5.91	7.56	8.35	7.67	7.00	8.37	7.70	0.88	7.62	0.12
CF—Pharmaceuticals, medicinal chemical	10.47	11.29	10.32	10.01	6.80	7.09	8.24	10.16	1.69	10.08	0.17
CG—Rubber and plastics products	12.54	3.66	2.33	0.14	−3.10	1.39	2.64	3.36	4.47	2.49	1.80
CH—Basic metals and fabricated metal	8.99	7.18	1.78	−0.06	4.44	5.07	5.72	5.19	2.86	5.13	0.56
CI—Computer, electronic, and optical	6.54	3.27	4.09	10.71	10.69	12.20	10.97	10.68	3.48	10.69	0.33
CJ—Electrical equipment	0.17	−1.99	6.56	1.52	2.37	1.49	0.45	1.99	2.44	1.51	1.62
CK—Machinery and equipment *n*.e.c.	7.75	7.33	2.81	5.07	6.24	6.35	5.29	6.05	1.53	6.15	0.25
CL—Transport equipment	4.45	2.31	−6.39	1.84	2.59	4.43	5.48	3.70	3.72	3.14	1.18
CM—Other manufacturing, and repair	5.07	−2.08	−0.40	1.35	0.15	0.98	1.54	2.82	2.14	1.17	1.84
Standard deviation (*SD*)	3.34	3.88	4.80	5.02	4.02	5.09	3.80	2.90			
Mean (*M*)	6.46	4.25	2.57	3.45	4.92	5.71	6.98	6.58			
Coefficient of variation (*SD*/*M*)	0.52	0.91	1.87	1.45	0.82	0.89	0.54	0.44			

Source: ORBIS, authors' elaboration.

Table 4. China, Rate of profit—return on assets (ROA) using Net Income—by manufacturing sectors (NACE classification), standard deviation, mean, and coefficient of variation (2007–2014)

	2007	2008	2009	2010	2011	2012	2013	2014	Standard deviation (*SD*)	Mean (*M*)	Coefficient of variation (*SD*/*M*)
CA—Food products, beverages, and tob	8.85	9.37	10.14	9.90	9.07	7.69	7.36	6.70	1.25	8.96	0.14
CB—Textiles, apparel, leather	5.63	5.77	6.33	6.58	4.27	3.20	3.73	3.59	1.34	4.95	0.27
CD—Coke and refined petroleum	1.46	-9.44	5.41	5.45	4.06	3.53	1.92	2.10	4.79	2.82	1.70
CE—Chemicals and chemical products	5.77	5.32	5.10	7.00	4.76	2.50	2.25	3.97	1.61	4.93	0.33
CF—Pharmaceuticals, medicinal chem	6.01	7.48	8.77	8.60	6.11	5.77	5.70	6.91	1.24	6.51	0.19
CG—Rubber and plastics products	5.86	5.75	7.22	7.53	5.65	3.06	3.84	3.67	1.65	5.70	0.29
CH—Basic metals and fabricated metal	6.80	4.18	3.55	3.87	1.71	0.39	1.26	1.25	2.12	2.63	0.80
CI—Computer, electronic, and optical	5.59	5.29	5.19	5.33	3.88	3.09	4.34	4.63	0.86	4.91	0.18
CJ—Electrical equipment	6.16	6.61	6.73	5.95	3.45	2.30	3.09	4.21	1.75	5.08	0.34
CK—Machinery and equipment n.e.c.	6.31	6.09	6.15	7.01	5.62	3.73	3.17	3.09	1.56	5.86	0.27
CL—Transport equipment	5.95	5.74	7.03	9.14	8.06	7.22	6.75	6.92	1.10	6.97	0.16
CM—Other manufacturing, and repair	6.65	7.41	8.13	8.12	7.57	5.90	5.18	6.28	1.08	7.03	0.15
Standard deviation (*SD*)	1.657	4.727	1.793	1.741	2.111	2.166	1.899	1.905			
Mean (*M*)	5.982	5.760	6.526	7.004	5.192	3.365	3.784	4.089			
Coefficient of variation (*SD*/*M*)	0.277	0.821	0.275	0.249	0.407	0.644	0.502	0.466			

Source: ORBIS, authors' elaboration.

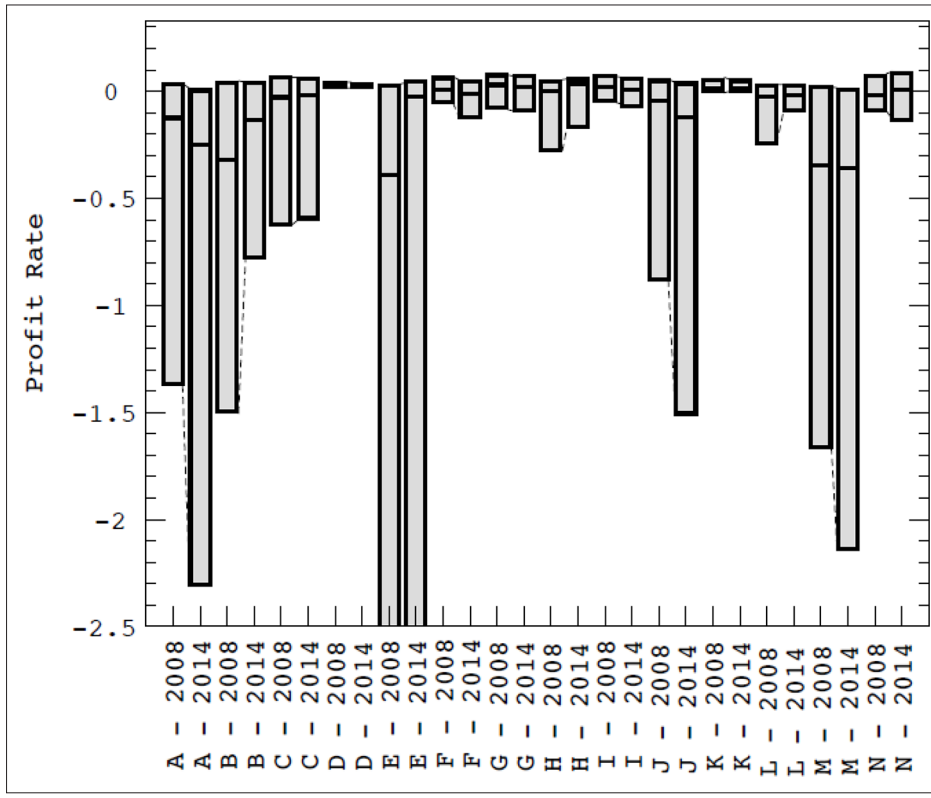

Figure 4. Third quartile of the distribution of rates of profit (top edge), median and first quartile of the distribution of rates of profit (bottom edge), according to NACE sectors. USA (2008 and 2014).

Source: ORBIS, authors' elaboration.

According to table 4, there is not a single matrix cell with a rate of profit greater than 10 percent in China,[15] while in the case of United States manufacturing there were 14 cells with rates of profit greater than 10 percent. table 3, for the United States, highlights two key leading technological sectors persistently reaching this level: both "manufacture of pharmaceuticals, medicinal chemical and botanical products" (NACE CF)[16] and "manufacture of computer, electronic and optical products" (NACE CI)[17] kept those high average rates during 5 different years.

Table 4 shows intertemporal differences presenting oscillation of all manufacturing sectors' rates of profit, reflecting changes in the rankings. The sector showing larger mean values was "manufacture of food products, beverages and tobacco products" (NACE CA) (8.85 percent), followed by "Manufacture of transport equipment" (NACE CL) (6.92 percent). Both means are greater than the average for "manufacturing" in table 2 (5.51 percent).

[15]However, in 2014, Huawei had a rate of profit equal to 12.5 percent

[16]Johnson & Johnson had a rate of profit above the average of NACE sector (CF) in 2014: 12.4 percent.

[17]Apple had a rate of profit above the average of this NACE sector (CI) in 2014: 17 percent.

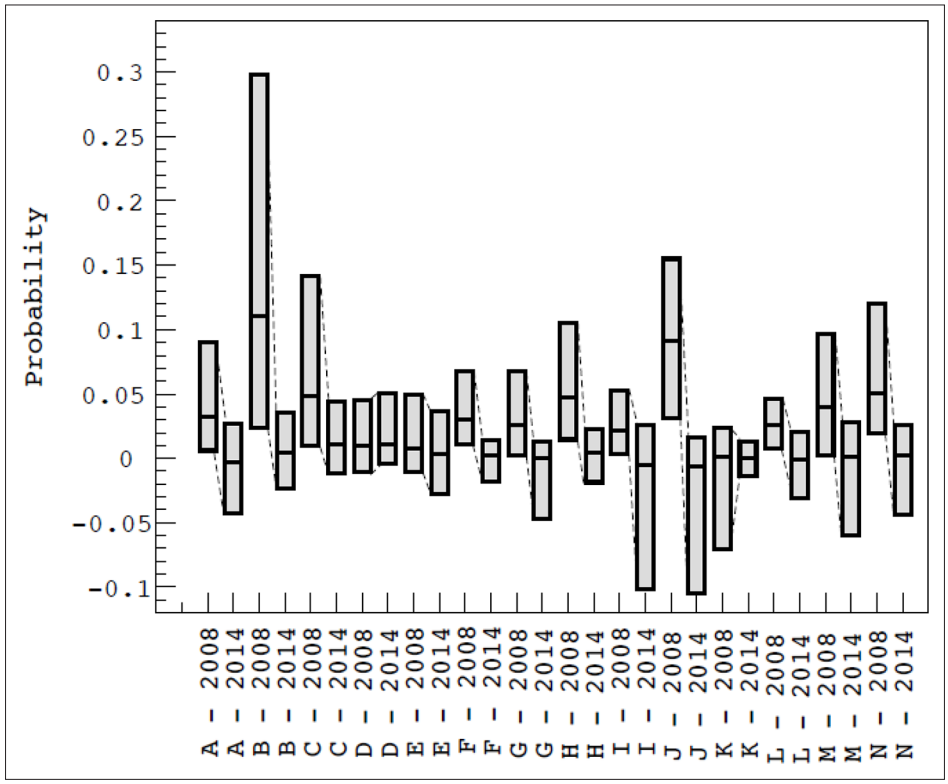

Figure 5. Third quartile of the distribution of rates of profit (top edge), median and first quartile of the distribution of rates of profit (bottom edge), according to NACE sectors. China (2008 and 2014).

Source: ORBIS, authors' elaboration.

5. Comparing the Distribution of Rates of Profit within Sectors

Figures 4 and 5 display the box plot[18] for intrasectoral profit rates of the United States and China in 2008 and 2014. The bottom edge represents the first quartile and the upper edge the third quartile, the line inside the box is the median. The height of each box is a measure of the dispersion of the rates of profit within that specific sector.

The average profit rate is computed by adding the net income and then dividing by the total assets of all firms in a sector, the median separates the higher half from the lower half of the data. Therefore, firms with a very high profit rate push up the average, while contributing with just one observation for the median. The same is true for firms with very low profit rate.

For the United States, figure 4, the box plots show that the dispersion of the profit rate increased for eight sectors and decreased in nine sectors between 2008 and 2014. It seems that the higher dispersion of the profit rates observed intersectorally, in table 1, is not present within those sectors. Another interesting result of figure 4 is the large percentage of firms with negative profit rates. This result is consistent with Scharfenaker and Simieniuk (2017). For some sectors, more than half of the firms display negative profit rates, while the average profit rates for these

[18] Wasserman (2004) for the technical information on those statistics.

sectors are positive (table 1). It may indicate that there is a small number of large firms with positive profit rates.

For China, figure 5 reveals a decline in the dispersion of the profit rate for 14 out of 17 sectors between 2008 and 2014. It is consistent with the movement of the distributions in the direction of lower profits rates observed in the period of study. The median declined for 16 of the 17 sectors. These results may reflect the expansion in the size of the firm in China verified in section 4. Despite the increase in the percentage of firms with negative profit rates in China between 2008 and 2014 and it is much lower than in the United States.

The analysis of the distribution of the profit rates within the sectors presents another indication that this variable displays a pattern consistent with a complex system, as those movements (figures 4 and 5) can have a direction different from the movements among sectors (tables 1 and 2).

6. Nonstability of the Distributions of Rates of Profit Over Time

The statistics description presented in section 4 show one phenomenon that deserves further discussion: the dispersion of rates of profit may increase, or may decrease, over time. More specifically, this dispersion did increase during the last crisis, as both table 1 (United States) and table 2 (China) have their highest coefficients of variation in 2008. Those variations in the dispersion of rates of profit are present also at the intramanufacturing level, as table 3 (for United States) and table 4 (for China) also show an increase in the coefficients of variation in 2008. However, the behavior of the rates of profit are different in the United States and in China. In the United States, comparing tables 1 and 3, there is a mismatch between the movements in the coefficients of variation: intersectorally (table 1) the highest coefficient of variation was in 2008, while within manufacturing (table 3) it was in 2009. In China, comparing tables 2 and 4, there is not such a mismatch between the two movements in the coefficients of variation: as both, the highest coefficients of variation are in 2008.

The statistics presented in section 5 show another feature of that phenomenon: changes in the dispersion of the rates of profit within those sectors. Those changes went in a different direction as in most sectors, both in the United States and in China, the intra-sectoral dispersion was reduced between 2008 and 2014.

Those differences in the direction of the changes in the distribution are hints of turbulent behavior, as each layer may behave differently. But, statistics described in the two sections (4 and 5) present preliminary evidences of nonstability of the distribution of rates of profit over time, especially when crises are considered.

To further investigate those differences in distributions of rates of profit over time, figure 6 organizes the data to show how they behave at the level of the firm.

The profit rate probability distribution is calculated as a relative frequency of companies that show each value of rate of profit—presented on the *x*-axis, from negative profits, −50 percent, and positive profits, +50 percent. The *y*-axis (probability, relative frequency) uses a logarithmic scale to improve the visualization of those different behaviors in the United States and China, for 2008 and 2014.

First, there are differences between those two countries. Those differences might be expected, given the different stages of development, different economic and manufacturing structures. The differences between the United States and China are easy to see, especially if we look to the two tails of the graph. Looking to the negative profit tail (negative profits below −20 percent) China in 2008 has less firms with negative profits than United States both in 2008 and 2014. Looking to the high positive profit tail (positive profits above +20 percent) China in 2008 has more firms earning those profits than the United States both in 2008 and 2014. Those differences in the distribution of rates of profit are consistent with data presented

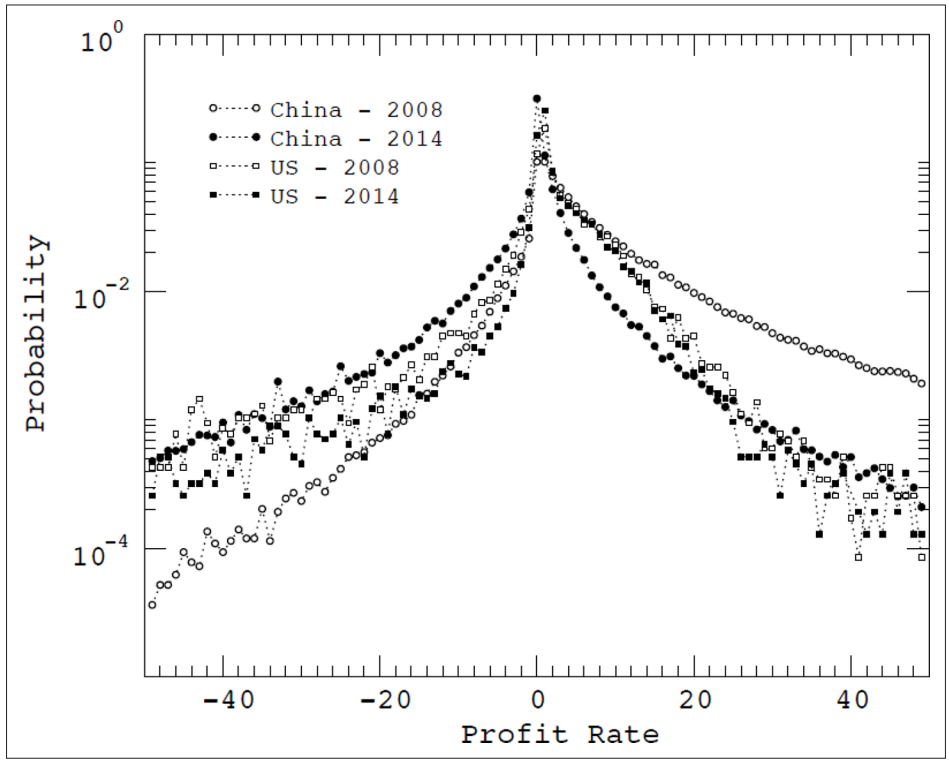

Figure 6. Relative frequency (probability) distribution of rate of profits (%) (USA and China, 2008 and 2014).

Source: ORBIS, authors' elaboration.

in section 4, as tables 1 and 2 show that the United States had more sectors with negative profit in 2008, while China had no sectors with negative profits. Those differences are consistent with data presented in section 5 also, as the distributions within sectors, in the case of the United States, went further in the negative than in the case of China.

Secondly, there are differences within each country, as the distributions for both countries have differences in 2008 and 2014. For China those differences are in both tails, with an increase in the number of firms with less than −20 percent and with a decrease in the number of firms with more than +20 percent. For the United States, those differences are more blurred in figure 6, but a closer look shows oscillations in the number of firms in every level of rate of profit, with more firms in the negative tail in 2008, even between −10 percent and 0 percent, differences in the peak of the distribution—more firms with 0 profits in 2014, and differences above 16 percent.

Differences in form and shape of those distributions vis-à-vis those found by Scharfenaker and Simieniuk (2017) might be consequence of different databases and, in the case of China, a different country.

Looking from three different points of view—intersector (section 4), within sectors (section 5), and at the firm level in this section—we find movements in the dispersion of rates of profit over time. Those movements in the dispersion of rates of profit, even in a limited database that covers only 8 years, may deserve further investigation and development. Even with such a

limited database, we think that empirically we have collected evidence that might question a stationary distribution of different rates of profit over time.

7. Conclusion

A new database—ORBIS—as a source for investigations of the behavior of the rate of profit allows us to combine the research on a national level and beneath this level to look at different sectors and different manufacturing subsectors. The initial exploration of this database has one important limit, given by the restricted time span of its data—2007 to 2014.

The exploration of those data focused on three issues, reviewed in section 3.

First, the trajectories of the national average rate of profit and their disaggregation by economic and manufacturing sectors.

Between 2007 and 2014, the average rates of profit in the United States and China presented different trajectories. International movements of capital may follow those differences, moving from countries with lower rates of profit toward countries with higher rates of profit. Those uneven movements of the rate of profit in the United States and in China, especially during the crisis of 2007–2008, may offer larger maneuvering room for the global economy. Figure 1 reveals that during very critical times, a fall in the rate of profit in one place may be compensated by a rise elsewhere: between 2007 and 2010, a fall in the United States and a rise in China, between 2011 and 2013, a fall in China and a rise in the United States.

Based on those national averages, this paper presents evidences of turbulent behavior among and within economic sectors. Those differences uncover evidences for further discussion on the dynamics of those two economies. The data highlight the capacity of the United States economy to preserve high profitability (even higher than in China) in key and strategic sectors like Information and Communication (NACE J) and manufacturing sectors like Computers and electronics (NACE CI)—strategic sectors in the current technological new paradigm. These data also show how China is evolving, with high profitability (actually higher than United States) in important sectors such as capital goods (NACE sectors CJ, CK, and CL) and even in a strategic sector as pharmaceuticals (NACE CF).

Secondly, a comparison between the distribution of different rates of profit by economic sectors shows differences in mean, median, and dispersion of rates of profit inter- and intrasectorally. There are different behaviors if we look to dispersion intersectorally (it is higher in 2008 in the United States and in China) or intrasectorally (higher in all sectors in China not in 2008, but in 2014, and with more sectors with higher dispersion in 2014 than in 2008 in the United States).

Thirdly, this paper collects evidence on the nonstability of those distributions of different rates of profit over time. In the three layers investigated in this paper, there are statistics that show changes in the dispersion of rates of profit. At the intersectoral level, both in the United States and in China in 2008, the dispersion is higher. At the intrasectoral level, there are also changes in the dispersion, with a behavior different from the intersectoral level—again in both countries. At the firm level, the shape of the distribution is different in the two countries studied and shows changes between 2008 and 2014.

These findings are a subject to further investigation and discussion. They put forward the question: what could be the theoretical implication for how competition and crises interact?[19]

Crises may be moments in the reconfiguration of capitalism. Crises are moments when bankruptcies intensify, when new opportunities for surviving firms open the conquest of markets

[19]This question was put forward by one of the referees.

made available by exiting firms, moments when each firm is tested in its ability to survive, moments when competition intensifies. Each firm will be affected differently, depending on its resources, flexibility, and innovative capacities.[20] Each sector will be affected differently, according to its position in the current capitalist dynamic. Crises are moments when new sectors may grow while others shrink. Crises are a disturbance in the system, leading to general reorganization—and, as a capitalist system is a self-organized complex system, it is not expected to collapse. On the contrary, crises reshape capitalism. During crises, under intensified competition, two different extremes coexist. On one side firms are going bankrupt, firms are suffering losses—negative profits, firms are struggling to survive, while on the other side firms capture new opportunities, especially firms in emerging sectors, preserving or increasing their profits. Therefore, this greater dispersion in rates of profit occurs.

These preliminary conclusions demand further research and theoretical development. First, there is the need to expand the time span of our analyses—later, we can also expand the number of countries to be analyzed. Second, we may look closer at the distributions of different rates of profit among and within sectors, to better understand that turbulent behavior that shows a different movement in their dispersions. Third, since evidence presented in this paper suggests a nonstationary behavior of those distributions over time, a deeper investigation of those distributions is called for across longer time spans and across other economies, thus providing empirical evidence that might serve as a basis for a more theoretical discussion on the economic meaning of those nonstationary distributions.

Appendix Table A1

Total of firms with information about return on assets (ROA) using Net Income and the percentage to the total of firms in the ORBIS database, China and USA (2007–2016)

	China		USA	
Year	Firms with ROA Net Income	%	Firms with ROA Net Income	%
2007	143,427	23%	12,189	66%
2008	203,999	32%	12,449	68%
2009	195,929	31%	12,683	69%
2010	171,698	27%	12,744	69%
2011	192,295	31%	15,825	86%
2012	206,613	33%	17,027	93%
2013	387,488	62%	16,851	92%
2014	332,804	53%	16,448	90%
2015	20,373	3%	13,321	73%
2016	2	0%	506	3%

Source: ORBIS, authors' elaboration.

Appendix Table A2

Rate of Profit—return on assets (ROA) using Net Income—according to firm size, USA and China (2007–2014)

Year	Firm size*	Number of firms—US	Rate of profit—US	Number of firms—CN	Rate of profit—CN	Year	Firm Size*	Number of firms—US	Rate of profit—US	Number of firms—CN	Rate of profit—CN
2007	A	1,871	1.94	596	3.83	2011	A	2,630	1.48	1,826	2.41
	B	1,948	2.84	1,805	5.09		B	2,640	2.07	4,961	4.91
	C	1,536	3.05	2,822	5.74		C	2,144	1.54	8,268	6.76
	D	1,200	1.82	4,191	6.11		D	1,589	0.86	12,113	7.49
	E	1,308	3.72	7,592	6.11		E	1,705	1.86	20,189	8.50
	F	4,339	3.30	126,421	7.44		F	5,127	0.24	192,398	12.24
2008	A	1,915	−0.16	776	3.93	2012	A	2,899	1.63	2,258	1.94
	B	2,015	−0.88	2,275	3.39		B	2,839	1.89	5,784	4.07
	C	1,593	0.00	3,801	5.54		C	2,291	1.02	9,408	5.94
	D	1,236	−0.78	6,115	6.02		D	1,700	0.45	13,815	6.72
	E	1,333	1.36	10,771	6.37		E	1,795	2.98	23,025	7.80
	F	4,370	1.39	180,263	8.75		F	5,522	−0.50	195,045	11.61
2009	A	1,995	1.15	872	3.47	2013	A	3,012	2.00	2,882	1.90
	B	2,062	0.98	2,497	4.59		B	2,804	2.31	6,901	4.32
	C	1,663	0.43	4,095	5.94		C	2,217	1.68	11,441	5.68
	D	1,203	−0.23	6,347	6.16		D	1,626	0.80	16,911	6.34
	E	1,368	0.54	11,322	6.80		E	1,765	3.09	27,899	7.58
	F	4,407	1.10	170,826	9.61		F	5,452	−0.37	366,971	9.79
2010	A	2,078	1.76	1,060	4.34	2014	A	3,067	1.75	2,485	1.69
	B	2,091	2.65	2,826	5.42		B	2,797	2.02	4,594	3.60
	C	1,663	2.54	4,266	6.54		C	2,110	1.28	5,687	4.62
	D	1,218	1.57	6,199	6.81		D	1,636	1.15	6,985	4.81
	E	1,344	2.86	10,651	7.10		E	1,757	5.07	10,085	4.39
	F	4,356	2.14	146,851	10.84		F	5,100	0.82	308,293	2.20

*Firm Size by Assets Size Range: A: assets over $1 billion; B: $250–$1,000 million; C: $100–$250 million; D: $50–$100 million; E: $25–50 million; F: less $25 million.
Source: ORBIS, authors' elaboration.

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