Global Concentration and the Rise of China

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Abstract: Using firm level data, we examine how global concentration has changed over the last decade in light of the rise of China. We find that global concentration has declined in most industries, is falling on average across industries, and there is significant churning of firms at the top of the distribution. The enhanced industrial competition is partly attributable to the rising market shares of emerging market firms at the expense of incumbent industry leaders. However, global concentration has risen significantly in a number of industries where Chinese state-owned enterprises dominate, such as mining, metals, real estate and construction. Controlling for mergers and acquisitions and other factors, we find that the presence of a Chinese SOE at the top of the firm-size distribution is associated with a 4 percentage point increase in concentration. The results imply that while the overall impact of China's rise has been a small but significant increase in global competition, state-ownership has significantly distorted global competition in a number of industries.

Introduction

Increasing trade and foreign direct investment make global concentration relevant for assessing competition in most industries, yet previous studies of market structure focus exclusively on domestic concentration. US data, which are most frequently used, show evidence of increasing industrial concentration since the mid-1990s, raising concerns about competition and reversing a trend of declining concentration since the 1970s.[1] The increase in US concentration, however, may be less indicative of rising market power if global competition is intensifying. While the top US firms are relatively larger than in the past, they may now be competing more intensely with large and growing firms from foreign markets.

The rise in US concentration is consistent with new trade models, showing that domestic concentration should increase as trade is liberalized (Melitz 2003). The most productive firms in an industry expand in world markets and grow rapidly, while the less productive shrink in the face of competition. Di Giovanni and Levchenko (2012) find that this is exactly what happens using data from 50 countries: trade opening makes the largest firms more important and hence volatility increases. But the effect on global concentration is less clear. It depends on which firms become more integrated into the global economy. If liberalization is uniform, the most productive firms in each industry would expand the most, likely raising concentration; but if reform is largely concentrated in less developed markets, global concentration could fall as the most productive firms from these economies take market share from former world leaders.

Over the last decade, arguably the single most important change to global competition has been the rise of emerging markets, especially China. In 2014, China surpassed the US to become the largest economy

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[1] White (2002) shows that aggregate concentration in the United States fell from the 1970s to the early 1990s. Furman and Orszag (2015) report an increase in the 50-firm concentration ratio in a number of US industries since the mid-1990s. A 2003 World Bank report finds that concentration declined slightly from 1983 to 1992 in Japan, and that the absence of comprehensive data precludes the calculation of global sectoral concentration.

in the world. Supporting China's rise are a group of fast-growing companies, many of which are state-

owned, that are now industry leaders. In 2006 there were only 41 Chinese firms that ranked in the top

1000 by revenue. By 2014, Chinese companies occupied 136 of the top spots, of which 60 percent are

state-owned. The rise of China could reduce global concentration if the new large firms are competing

with existing large firms from industrial countries. But if the new companies are somehow different,

either because of China's market size or the high share of state-ownership, they could enhance

concentration.

There is little existing work on global concentration, but there is a perception that big companies are

dominating. For example, The Economist magazine recently issued a Special Report on the world's most

powerful companies, with the header "A small group of giant companies—some old, some new—are

once again dominating the global economy". Other researchers highlight mammoth corporation size by

comparing their revenues to countries' or governments' GDPs, for example, Walmart to Norway or

Exxon Mobil to Greece.[2] One purpose of this study is to evaluate whether the rise of global giants and

US concentration is also reflected in a rise in global concentration. If giants are rising around the world

and dominating different industries, global concentration will rise, but if the best companies are growing

from many countries within industries and competing with each other, concentration could fall.

The same economic concerns that relate to domestic concentration are likely to extend to global

concentration. In particular, higher concentration could indicate a worrisome trend toward the

excessive market power of a handful of firms and ultimately higher prices. It could also have negative

consequences for volatility if supply depends largely on a few firms, especially if they are geographically

concentrated. Excessive state support could lead to an inefficient rationalization in some industries,

with relatively unproductive state firms rising to the top. As noted above, concentration is not always

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[2] Global Policy Forum.
https://www.globalpolicy.org/images/pdfs/Comparison_of_Corporations_with_GDP_of_Countries_table.pdf.

bad. Higher concentration could also reflect cost saving and greater efficiency in some industries, as the most efficient global producers expand or take advantage of returns to scale.

But, before considering potential effects, it is important to measure whether and in which industries global concentration is actually rising. Measuring global concentration was not possible until now because the data required are difficult to find.[3] We use data from the Bureau van Dijk Orbis database to examine global concentration from 2006 to 2014.   The problem with using earlier vintages of the data for this purpose is that the data were not gathered in enough countries with strong and systematic coverage systematically.

The data show that global concentration on aggregate, in most industries, and on average across industries has decreased since 2006. In particular, the four-firm concentration ratio has declined on average by about 4 percentage points, and three-quarters of the 85 industries have recorded a decline. In addition, there is a high level of churning among the largest firms, indicating that the threat of competition remains strong. Across the industries, on average, one-third to one-half of top 4 firms (and top 10) are distinct in 2014 as compared with 2006.

The fall in global concentration suggests that the rise of China and other emerging markets have contributed to a reduction in global concentration, as fast-growing firms from these countries take some market share from industrial country firms.   This is reflected in global composition of many industries. A good example is information services, where the share of Chinese firms in the top 650 rose from 19 to 147, and the four-firm concentration ratio fell by 12 percentage points.

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[3] One exception is De Grauwe and Camerman (2002), who use the growth in sales of the 50 largest companies relative to the growth in GDP of the 50 largest countries to estimate changes in corporate concentration. They find that the ratio declined from 1980 to 2000, though differences between how sales and value added are measured make this an unsatisfactory measure. Sales are a gross figure while GDP is value added, so changes in the production structure toward more or less vertical specialization could show large swings in concentration even when there is little change.

But, averages obscure significant variation across industries. Examining the correlates of the change in concentration across industries with industry characteristics offers some important insights.   An increasing number of emerging market, and especially Chinese firms in an industry is associated with a small but significant drop in concentration.   However, when Chinese state-owned enterprises dominate an industry, concentration increases. The correlation is economically meaningful: The presence of a Chinese SOE in the top four firms in an industry is associated with a 4 percentage point rise in concentration from 2006 to 2014. A good example is coal, where China Shenhua Energy Co had a 4.6 percent market share in 2006 and a 10.2 percent market share in 2014, and the four-firm concentration ratio increased by more than 3½ percentage points. There is also some evidence that large mergers and acquisitions enhance global concentration though to a far lesser extent than the presence of Chinese SOEs.

Overall, the decline in global concentration and robust churning in most industries implies that global competition remains robust. The rise in concentration in industries associated with Chinese SOEs, however, could indicate a shift towards less competitive markets when the state interferes.

Measures of concentration

There are three important issues to measuring concentration. One relates to which data to use, revenues, value added, employment, etc. Two is the specific index to use: four-firm concentration, 10-firm concentration, Herfindahl-Hirschman etc. Three reflects concerns specific to the Orbis dataset and the scale over which concentration is measured.

In terms of which variable to use, value-added is the best measure since it reflects the contribution of a given firm and does not suffer from double counting that will be present when revenues are used.

Unfortunately, value added data are frequently missing. Of the top 1000 firms by revenues, only 343 report valued added data. Employment is even more frequently missing.

Because of data availability, we focus on revenues for this analysis. The main concern with revenues is that the inputs used in production by one firm will be counted as part of its size, which will tend to exaggerate the size of assembly and distribution firms. Still, the change in concentration measured using revenues will be a useful indicator of concentration provided that *within* industries, the value-added share across the firms is similar or that it does not change much over time. In addition, by focusing on within industry concentration, distribution is separated from production.

Country level concentration, such as calculated by Census in the United States, uses the total revenues from the firm earned in the United States. In contrast, for global concentration, we use the total revenues from the firm, irrespective of where it is earned

The two indices we use are the four-firm concentration ratio and the Herfindahl-Hirschman (HH) index. The advantages of the four firm concentration ratio is that it is simple to understand and reflects the importance of the largest firms. Despite using a truncated sample, as data are only consistently available for the largest 1000 firms in an industry, the four-firm concentration ratio also captures skewness along the full distribution, assuming the data are drawn from a Pareto distribution.[4] Higher concentration would imply that the distribution is becoming more skewed over time.

The HH index, which is the sum of the squares of market shares, captures more of the texture of the data but is also more complex. To see the difference, consider the following example: if the four largest firms have a market share of 20 percent each, or the top firm has 50 percent and the next three have 10

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[4] The top portion of the firm size distribution is well known to closely follow a power law. As a result, the share of the top 4 firms in the top x can be represented as $(4/x)^{(e-1)/e}$, where e is the power law exponent, such that a higher e indicates less concentration. The important point is that even when the distribution is truncated, it is sensible to compare the ratios over time.

percent, the four firm concentration will be the same—80 percent. In contrast, the HH index will record higher concentration in the latter case. In addition, the HH index picks up skewness throughout the distribution as all firms' market shares are considered.

Finally, the Orbis data raise two other concerns. First, they are not comprehensive: coverage for private firms is limited and coverage improves over time. Using the full data available as the denominator would thus bias in favor of a reduction in concentration since the denominator would be increasing in part as a result of rising coverage. To deal with this problem, we focus on the top of the distribution, where the coverage tends to be good throughout the period. In particular, we download up to 5000 firms per industry (some industries have fewer firms) and the sample used is the top 1000 in each of 85 industries from the raw data.[5]

The second concern is double counting. Orbis lists both unconsolidated and consolidated financial accounts, so firm revenues may be counted multiple times because the sample includes both the consolidated accounts of parent firms (with their subsidiaries) and the unconsolidated accounts of both parent and subsidiary firms. In addition, the firm source country is defined by the location of the firm headquarters, so cross-listed firms are listed more than once, with unique owner ids. Most studies have attempted to tackle these issue by dropping from their samples the consolidated accounts of parent firms. For the purpose of this study, this approach is unsatisfactory. Since we are interested in the very largest firms across industries, dropping consolidated accounts would remove these firms from the sample. In addition, not all firms list both consolidated and unconsolidated. Instead, subsidiaries of firms with consolidated accounts appearing in the data are dropped—in this way, double-counting is

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[5] We exclude the tobacco industry because there are very few firms in this sector, as well as sectors relating to household production as there are no large firms.

avoided, but information on large parent firms is retained. [6]   In addition, we remove cross-listed firms.[7]

Once subsidiaries and cross-listed firms are dropped, our preferred sample is the top 650 firms in each

industry.

To the extent that coverage improves disproportionately outside the top 4, but in the top 650, the

results could still be biased in favor of a decrease in concentration since some firms may be missing in

the first period and replaced with smaller firms, reducing the denominator. For further robustness, we

use the top 250 incumbent firms. Using incumbent firms will reverse the bias to favor an increase in

concentration since it is more likely that a top 250 firm at the end of the period was not covered in the

early period than that a top 4 firm was not covered. As a result, the denominator is likely to be biased

down in the latter period because many of the recently listed firms in the top 250 will be excluded from

the sample in favor of smaller incumbent firms.

As a first look at the data and to compare it with other sources, we compare aggregate concentration

indices from Orbis with those calculated using other data from the top firms reported by FT and Forbes.

There are differences between the data definitions that will affect the level of measured concentration.

In particular, FT and Forbes consider only publicly listed companies and FT selects firms for the list based

on market capitalization while Forbes takes an average of sales, profits, assets, and market value to

create its list. Despite these differences in how the group of firms is chosen, if concentration is in fact

moving in one direction we would expect the three series to report changes in the same direction.

Table 1 records the results. All three series record declines in concentration, whether using the four

firm concentration ratio or the HH index. They are steepest using FT; Orbis and Forbes report similar,

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[6] Only the largest observations by revenue for every corporate group (global ultimate owner or GUO) is retained-
in this way, the possibility of duplicates appearing in the data is attenuated.
[7] We search for cross-listed firms, which have different GUOs, by matching on the first 7 characters of the name
and the revenues and then manually compare the results to ensure we are capturing cross-listed firms. There are
109 such firms.

albeit small, reductions. All three series also show an increase in the share of emerging market, especially Chinese, firms.[8]

The declines in firm concentration are consistent with declines in the global concentration of aggregate income. Measured using nominal $US GDP, global concentration of aggregate income during the period fell slightly. The share of the top four countries in a balanced panel of countries fell from .48 to .47 over the period, and the HH index dropped from 1014 to 847, as emerging markets countries grew faster than the rich world.

From an aggregate perspective, the results are consistent with the rise of the South being associated with lower industrial concentration. Research shows that an important element of industrial growth is the lifecycle dynamics of firms—the extent to which the most productive firms can grow rapidly into large firms. Hsieh and Klenow (2014), for example, estimate that the failure of small firms to grow into large firms reduced productivity growth in manufacturing by 25 percent in Mexico and India compared with the United States. As emerging markets have grown, lifecycle dynamics have improved, with some highly productive firms growing fast and contributing to aggregate productivity growth. These firms also affect global market structure as they access world markets and compete with industrial country leaders.

Industry aggregates

Even if aggregate concentration declines slightly, *within* industry concentration could be increasing or decreasing, as the top 1000 global firms are dominated by industries with very large firms, such as banks and oil companies, and include only a handful of firms from other industries.

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[8] Freund (2016) shows that from 1993 to 2014 China went from having 2 Fortune 500 firms to 95 and links the growth in big business to the China's increasing shares of the world's billionaires.

Using the NACE revision 2 classification of 85 industries, Figure 1 shows the four-firm concentration ratio in 2006 versus concentration in 2014 over time, where the size of the point reflects the size of the industry (as reflected by revenues of the top 650 firms in each industry in 2014).   Overall, concentration has been decreasing.   On average concentration has fallen by 4.1 percentage points, and nearly 80 percent of industries report a decrease.

Table 2 records average declines in concentration and weighted concentration, as well as HH indices, using the three samples discussed above. Whether measured using the four-firm concentration index or the HH index, the sample of 1000 (column 1), 650 firms (column 2), or incumbent firms (column 3), there is a decline in concentration. Figure 1 shows that the larger industries tend to report lower concentration. The overall decline, when weighted by industry size grows to 4.4 percentage points. Column 3 reports results using the sample of incumbent firms, which as discussed above will be biased in favor of finding a rise in concentration. Even using this index, concentration declined, with over half of industries recording a drop.

Churning

While concentration indices present a useful snapshot of static competition, competition can still be weak if there is little threat from new firms replacing incumbents over time. A useful measure of dynamic competition is churning—the extent to which fast growing firms replace old superstars in a sector. Greater churning would imply that even if concentration is high, the threat of competition is strong.

To measure churning, a stability index is calculated for the top 4 and top 10 firms in the sector. It is the share of firms that are present in the group in both periods. For example, in 2014 if 3 of the top 4 firms

are the same in 2006 the stability is 0.75. A lower stability index indicates more churning, where zero means all the firms are new and one means all the firms are the same.

Table 3 records the results. Overall there is a significant amount of churning using both 4 and 10 firms, with nearly half of the top firms being replaced over the period.

Again, the problem of improving coverage could lead to overestimated churning. While some firms in the top four are in fact new firms, others are not. For example, Facebook was not in the top 1000 firms in Computer programming and related activities in 2006, but was a top 10 firm in 2014. In this case, Facebook is a new firm that is a real part of churning. Other firms, however, enter the sample but are not actually new firms, instead data was missing in 2006. One extreme example is Archer Daniels Midland, which begins reporting in Orbis in 2007, though it existed and was very likely a top 4 food producer in 2006 as well as 2014. As a result, for robustness, we again also calculate the stability index using the sample of incumbent firms—firms that were top 250 in both periods. This will significantly bias up the stability index because fast growing new firms like Facebook will be absent, but provides an upper bound for stability.

Results are recorded in Table 3. Even using the upward biased statistic, significant churning is evident over the period, with about one third of top 4 firms and about one quarter of top 10 firms being new. Results are robust to excluding China.

Figure 2 shows the geographical distribution of the leading firms in 2006 and 2014, as classified by broad sector, where a leading firm is a top 4 firm in any one of the 84 industries. Big gains are evident in China, matched by losses in Europe, where national champions have been replaced by Chinese firms in 11 industries. In contrast, the flip side of rising US concentration has been that large US corporations have maintained their global ranking.

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Variation across sectors

The results show that on average industrial concentration is falling and churning is strong, and that the change may be attributable in part to the rise of new firms from China and other emerging markets as industry leaders. In particular, the rise of China would reduce global concentration if new fast-growing firms are competing with established firms from US, Europe and Japan and spreading production around the globe more evenly. However, it could enhance concentration if the top Chinese firms are relatively larger, perhaps because of domestic market size or the prevalence of state-owned firms.

An additional change over the period is a boom in mergers and acquisitions worldwide since 2005 (Figure 3). In 2015, there were over 46,000 transactions, with a total value of more than $4.5 trillion. Of the 30 largest deals in history, nearly half occurred since 2005, including huge cross-border mergers such as Anheuser-Busch Inbev and SAB Miller and Royal Dutch Shell and BG Group PLC.   To put these in perspective, the resulting beer company has 25 percent of the global beer market; while the new petroleum giant becomes the second largest private oil company. The wave of consolidations could promote global industrial concentration, as large firms merge into mammoth ones.

The surge in mergers and acquisitions may have also affected concentration in some industries. M&A activity has been concentrated, with over half of the total value occurring in just 13 industries. Because mergers and acquisitions are clustered in a handful of industries, aggregates and averages could still contract even if M&A activity raises concentration in some industries.

To explore the causes for the decline in average concentration, we next examine the characteristics of industries with rising and declining concentration.

Table 4 lists the sectors with the greatest increases and greatest declines in concentration. An interesting pattern emerges. The sectors with the fastest falling concentration tend to be nontradables services, such as travel, research, maintenance, legal. Only one manufacturing industry falls in this

category: electronics. This is consistent with the rise in China and other emerging markets reducing global concentration in some sectors. As their companies grow, global concentration falls. That this is most prevalent in the nontradables may be due to the companies in these sectors largely reflecting the income distribution of countries.

In contrast, the sectors with rising concentration are sectors where state-owned firms have been more prevalent, such as mining and civil engineering, and also sectors where mergers and acquisitions boomed, such as oil & gas and beverages.

To examine the effect of emerging market growth, SOEs and mergers and acquisitions on the change in concentration, Table 5a examines correlates with the change in the four-firm concentration ratio, using the preferred sample of 650 firms.[9] Column 1 regresses the change in the four-firm concentration ratio on the change in the number of emerging market firms in the industry, controlling for the initial level of concentration.[10] The coefficient is negative and significant, indicating a greater number of new emerging market firms tends to reduce concentration.   Specifically, the coefficient of .05 implies that ten additional emerging market firms in an industry reduces concentration by about one-half of one percentage point. Column 2 repeats the exercise including the change in the number of Chinese firms. Chinese firms alone significantly reduce concentration, though the effect is smaller. Column 3 includes both variables and overall emerging market firms have a bigger effect. Columns 4 and 5 examine the importance of state-owned enterprises and Chinese state-owned enterprises in particular. When state-owned enterprises are present in the top four, concentration expands; the importance of Chinese state-owned enterprises is even more important. Specifically, an additional state owned firm from China in

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[9] For a subset of 35 traded sectors, we also examined the correlation with the expansion in trade, but found no significant effects (Appendix Table D).
[10] Controlling for Initial levels allows for some mean reversion, where industries with higher concentration may be more likely to see concentration fall (or less likely to see it rise further). Results are similar if we do not control for initial levels.

the top 4 raises concentration by 5 percentage points. Column 6 includes both variables and while they are jointly significant (p-value 0.01), neither is individually significant. There is a lot of overlap as 14 of total 36 of the top 4 that are SOEs are Chinese. The coefficient on Chinese SOEs is more than twice as large as the coefficient on SOEs, suggesting the Chinese SOEs are particularly important for concentration. Column 7 examines the importance of mergers and acquisitions. The variable is a one if the sector is a top 10 sector for M&A activity (value). Extensive mergers and acquisitions have also increased concentration. Finally, the last column includes all three variables. Overall, the results show that while more emerging market firms in an industry tend to reduce concentration, the presence of Chinese state-owned enterprises expands it. The coefficient shows that the effect is economically significant: Each additional Chinese SOE in the sector's top 4 firms raises the concentration by 4-5 percentage points.

Tables 5b and 5c repeat the exercise on the other samples. Results are robust to using the raw sample and the incumbent sample and coefficients are similar.

Tables 6a-6c repeat the regressions using the ln difference of HH index. In this case SOEs are measured by an index using all data, similar to the Herfindahl index, giving a higher weight to the existence of SOEs at the top of industry rankings. Specifically, the SOE index is constructed as the sum of 0.5 to the power of the revenue rank of SOEs within an industry. If there are no SOES in an industry, the index is zero and if all firms are SOEs, the index approaches 1. As an example, if there are two SOEs, one rank #2 and one rank #7, the index is ($.5^2 + .5^7 = .258$).

Results are robust, the rise of emerging market firms have reduced concentration, but the rise of SOEs, and particularly Chinese SOEs have expanded concentration significantly.

The results show that the presence of Chinese SOEs in an industry is associated with rising concentration, but that does not mean Chinese SOEs cause concentration to rise. There are three

possibilities: (1) China SOEs themselves account for rise in concentration, (2) other firms merge to compete with China SOEs, (3) China supports firms in industries where concentration is rising. The first two are causal from Chinese SOEs to concentration, but the latter reflects reverse causality. To examine the importance of Chinese SOEs, we estimate concentration in the 11 sectors where Chinese SOES are prominent, with and without the SOEs. On average in the 11 industries, concentration excluding the SOEs would have fallen by 1.9 percentage points. Including the SOEs, concentration rose by 1 percentage point. The importance of SOEs for the direction and magnitude of the change in concentration offers evidence that Chinese SOEs are distorting competition.

Conclusion

This paper shows that over the period from 2006 to 2014, global concentration fell on average and in most industries, while churning at the top of the distribution remains robust. Part of the fall in concentration is attributable to growing competition from emerging markets, especially China. This more intense global competition to some extent eases concerns about growing monopoly power within the United States.

Despite the average decline in concentration, there are a number of sectors where global concentration is rising and concern may be warranted. These include: Natural resources, metals, mining, real estate, civil engineering, crops and meat. Many of the sectors with increasing concentration tend to be dominated by Chinese state-owned firms. In particular, regression results show that sectors with Chinese SOEs at the top have seen concentration rates rise by 4 percentage points more than other sectors, suggesting that state firms are different from large private firms, in terms of their dominance in a sector.

The rise of "state capitalism" has received increased attention as China's firms go global, but so far estimates of the effect on the global economy are mainly anecdotal.[11] This paper shows that distortions to global concentration owing to Chinese state firms are already present. Moreover, many of the industries are upstream, so effects are likely to carry over through cheap inputs to downstream sectors. This has implications for market structure, efficiency, and policy.

Increasing concentration, especially resulting from state-owned firms, also raises political economy anxieties. Large multinationals can influence their government to modify and enforce rules to their advantage, and special treatment may be easier for the government to justify when the competition is foreign. Such incentives are that much stronger when the state owns the country's largest firms. State monopolies result in the same kind of problem that Marx ascribed to runaway capitalism and monopoly: Firms fused with the government write the rules of the game. As these firms compete in global markets, rising state intervention also affects foreign producers. From the perspective of China's competitors, free trade will become less desirable if the competition has government backing, making trade rules that discipline the behavior of SOEs important.

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[11] See for example the European Council on Foreign Relations "The Scramble for Europe" and the Economist "State Capitalism".

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Figures and Tables

Table 1: Global Concentration Indices			
	Orbis Top 1000	Financial Times 500	Forbes 2000
Four Firm Concentration			
2006	5.7%	11.5%	4.7%
2014	4.8%	10.2%	4.6%
Herfindahl-Hirschman Index			
2006	27.7	80.9	22.6
2014	24.1	77.3	21.4
Stability			
Top 4	75%	75%	75%
Top 10	50%	50%	40%
Number of Emerging Market firms			
2006	138	45	298
2014	249	52	566
Number of Chinese firms			
2006	41	7	64
2014	136	32	207

Table 2: Four Firm Concentration Indices, averages across industries

Average Levels	Top 1000	Top 650 Unique	Top 250 Incumbent
2006	25.1%	30.6%	34.4%
2014	21.8%	26.6%	33.5%
Weighted levels			
2006	21.6%	29.9%	34.4%
2014	19.5%	25.5%	34.0%
Change			
Average	-3.3%	-4.1%	-0.9%
Weighted	-2.1%	-4.4%	-0.4%
Share (-)	75%	76%	57%
Herfindahl-Hirschman Index			
2006	316.3	452.9	563.0
2014	249.1	352.5	499.9
Average Change	-6.7%	-6.9%	-0.79%
Share (-)	78%	80%	62%
Without China			
Average Levels			
2006	25.8%	31.3%	34.9%
2014	22.4%	27.5%	34.1%
Weighted Levels			
2006	22.3%	30.7%	35.0%
2014	19.7%	26.5%	34.5%
Herfindahl-Hirschman Index			
2006	334.6	473.6	580.1
2014	270.2	382.5	517.8

Table 3: Stability Indices

All Countries	Top 4 Firms	Top 10 Firms
Full Sample	52%	56%
Incumbent Firms	65%	72%
Without China		
Full Sample	51%	53%
Incumbent Firms	67%	75%

Table 4: Sectors with largest increases / decreases in concentration

Largest Decreases		Largest Increases	
Gambling and betting activities	-29.7%	Other mining and quarrying	45.6%
Travel agency and tour operator reservation services	-26.7%	Public administration and defense	26.7%
Residential care activities	-23.4%	Libraries, archives, museums and other cultural activities	14.3%
Veterinary activities	-22.5%	Crop and animal production, hunting and related service activities	10.9%
Forestry and logging	-21.0%	Civil engineering	7.5%
Specialized construction activities	-16.2%	Publishing activities	7.1%
Water collection, treatment and supply	-14.9%	Printing and reproduction of recorded media	7.0%
Scientific research and development	-14.8%	Mining support service activities	6.2%
Fishing and aquaculture	-14.2%	Manufacture of leather and related products	6.0%
Manufacture of electrical equipment	-13.6%	Manufacture of wearing apparel	5.6%
Repair and installation of machinery and equipment	-13.6%	Manufacture of computer, electronic and optical products	4.1%
Social work activities without accommodation	-13.3%	Real estate activities	3.9%
Information service activities	-12.3%	Mining of coal and lignite	3.6%
Activities of membership organizations	-12.0%	Construction of buildings	2.5%
Warehousing and support activities for transportation	-12.0%	Manufacture of beverages	2.2%

Table 5a: Emerging Market Firms, SOEs, and Concentration (Top 650 Firms)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
EM Change	-0.054 (2.93)***		-0.050 (1.93)*	-0.061 (3.40)***	-0.071 (3.82)***	-0.070 (3.72)***	-0.055 (3.02)***	-0.070 (3.73)***
China change		-0.032 (2.15)**	-0.004 (0.19)					
SOEs				2.951 (2.56)**		1.448 (0.95)		
Chinese SOEs					5.266 (2.83)***	3.715 (1.50)		4.623 (2.37)**
M&As							4.138 (1.85)*	2.517 (1.10)
Initial Concentration	-0.394 (5.10)***	-0.353 (4.64)***	-0.394 (5.07)***	-0.414 (5.51)***	-0.397 (5.35)***	-0.406 (5.43)***	-0.385 (5.05)***	-0.391 (5.27)***
R^2	0.25	0.22	0.25	0.31	0.32	0.33	0.28	0.33
N	84	84	84	84	84	84	84	84

* $p<0.1$; ** $p<0.05$; *** $p<0.01$

Table 5b: Emerging Market Firms, SOEs, and Concentration (Top 250 Incumbent Firms)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
EM Change	-0.083 (1.10)		0.001 (0.01)	-0.074 (1.00)	-0.110 (1.52)	-0.108 (1.45)	-0.086 (1.15)	-0.109 (1.50)
China Change		-0.155 (1.54)	-0.157 (1.06)					
SOEs				2.038 (2.06)**		0.201 (0.15)		
Chinese SOEs					4.678 (2.98)***	4.458 (2.09)**		4.295 (2.60)**
M&As							2.795 (1.57)	1.365 (0.76)
Initial Concentration	-0.210 (3.44)***	-0.213 (3.66)***	-0.213 (3.47)***	-0.205 (3.42)***	-0.214 (3.67)***	-0.214 (3.63)***	-0.205 (3.37)***	-0.211 (3.60)***
R^2	0.13	0.14	0.14	0.17	0.22	0.22	0.16	0.22

N	84	84	84	84	84	84	84	84

Table 5c: Emerging Market Firms, SOEs, and Concentration (Top 1000 Firms)								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
EM Change	-0.021 (2.37)**		0.003 (0.19)	-0.025 (2.81)***	-0.027 (3.06)***	-0.028 (3.06)***	-0.020 (2.31)**	-0.025 (2.82)***
China Change		-0.021 (3.33)***	-0.022 (2.26)**					
SOEs				2.564 (2.29)**		0.960 (0.64)		
Chinese SOEs					4.419 (2.74)***	3.477 (1.59)		3.379 (2.00)**
M&As							5.047 (2.62)**	3.699 (1.84)*
Initial Concentration	-0.347 (4.68)***	-0.331 (4.85)***	-0.326 (4.47)***	-0.367 (5.04)***	-0.350 (4.90)***	-0.357 (4.92)***	-0.328 (4.55)***	-0.336 (4.74)***
R^2	0.21	0.26	0.26	0.26	0.28	0.28	0.27	0.31
N	85	85	85	85	85	85	85	85

Table 6a: Emerging Market Firms, SOEs, and HH (Top 650 Firms)								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
EM Change	-0.003 (2.37)**		-0.003 (1.84)*	-0.003 (2.89)***	-0.004 (3.17)***	-0.004 (3.09)***	-0.003 (2.39)**	-0.004 (3.12)***
China Change		-0.001 (1.48)	0.000 (0.27)					
SOE Weight				0.765 (2.51)**		0.394 (0.88)		
Chinese SOE Weight					1.137 (2.61)**	0.721 (1.12)		1.093 (2.43)**
M&As							0.140 (0.98)	0.060 (0.42)
Initial HH	-0.001	-0.000	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001

	(3.67)***	(3.25)***	(3.66)***	(3.81)***	(3.77)***	(3.79)***	(3.55)***	(3.69)***
R^2	0.16	0.12	0.16	0.22	0.22	0.23	0.17	0.22
N	84	84	84	84	84	84	84	84

* $p<0.1$; ** $p<0.05$; *** $p<0.01$

Table 6b: Emerging Market Firms, SOEs, and HH (Top 250 Incumbent Firms)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
EM Change	-0.006		-0.005	-0.006	-0.007	-0.007	-0.006	-0.007
	(1.65)		(0.84)	(1.59)	(2.02)**	(1.95)*	(1.66)	(2.01)**
China Change		-0.008	-0.003					
		(1.47)	(0.38)					
SOE Weight				0.482		0.064		
				(2.28)**		(0.22)		
Chinese SOE Weight					0.973	0.903		1.010
					(3.07)***	(2.00)**		(2.99)***
M&As							0.062	-0.031
							(0.67)	(0.33)
Initial HH	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000
	(4.23)***	(4.15)***	(4.21)***	(4.12)***	(4.45)***	(4.36)***	(4.15)***	(4.44)***
R^2	0.18	0.18	0.18	0.23	0.27	0.27	0.19	0.27
N	84	84	84	84	84	84	84	84

* $p<0.1$; ** $p<0.05$; *** $p<0.01$

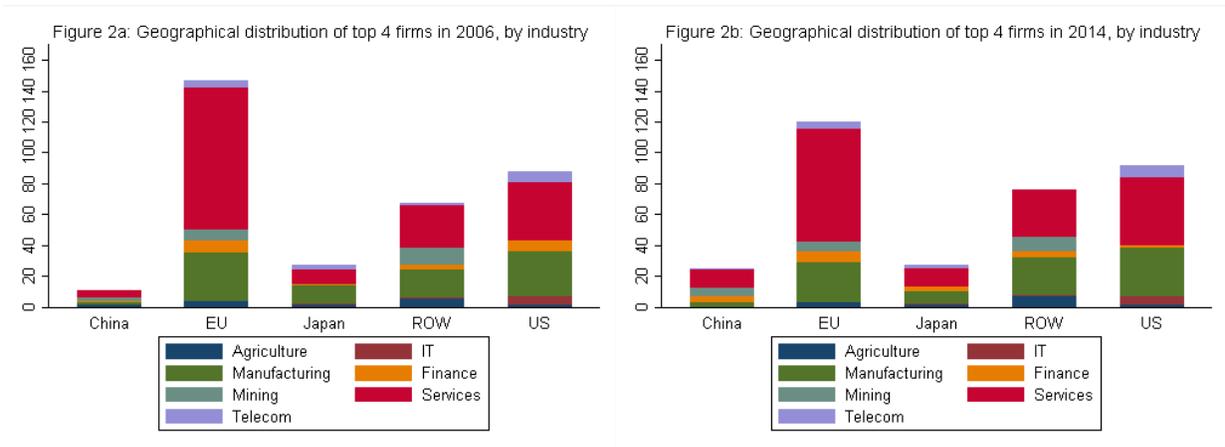### Table 6c: Emerging Market Firms, SOEs, and HH (Top 1000 Firms)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
EM Change	-0.001		-0.000	-0.001	-0.001	-0.001	-0.001	-0.001
	(1.78)*		(0.01)	(2.24)**	(2.34)**	(2.34)**	(1.70)*	(2.19)**
China Change		-0.001	-0.001					
		(2.28)**	(1.40)					
SOE Weight				0.755		0.421		
				(2.34)**		(0.85)		
Chinese SOE Weight					1.042	0.603		0.903
					(2.36)**	(0.89)		(2.00)**
M&As							0.253	0.186
							(1.79)*	(1.30)
Initial HH	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001
	(2.92)***	(2.80)***	(2.62)**	(3.01)***	(2.95)***	(2.97)***	(2.72)***	(2.79)***

R^2	0.10	0.12	0.12	0.16	0.16	0.17	0.14	0.18
N	85	85	85	85	85	85	85	85

<center>* $p<0.1$; ** $p<0.05$; *** $p<0.01$</center>

<center>Table 7: Sectors with Chinese firms in top 4, 2014</center>

Sector	Number of Chinese Firms	Number of Chinese SOEs
Mining of coal and lignite	2	1
Extraction of crude oil and petroleum	1	1
Other mining and quarrying	1	
Mining support service activities	1	1
Manufacture of wearing apparel	1	
Manufacture of other non-metallic mineral products	1	
Manufacture of fabricated metal products	1	
Electricity, gas, steam and air conditioning supply	1	1
Construction of buildings	1	1
Civil engineering	4	4
Wholesale trade, except of motor vehicles and motorcycles	1	1
Warehousing and support activities for transportation	1	
Telecommunications	1	1
Activities auxiliary to financial services and insurance activities	2	1
Real estate activities	2	1
Other professional, scientific and technical activities		
Education	1	1
Gambling and betting activities	1	
Sports activities and amusement and recreation activities	1	

Figure 1: Four Firm Concentration Ratios, 2006-2014

Figure 2a: Geographical distribution of top 4 firms in 2006, by industry

Figure 2b: Geographical distribution of top 4 firms in 2014, by industry

Figure 3: Number and Value of Mergers and Acquisitions Worldwide
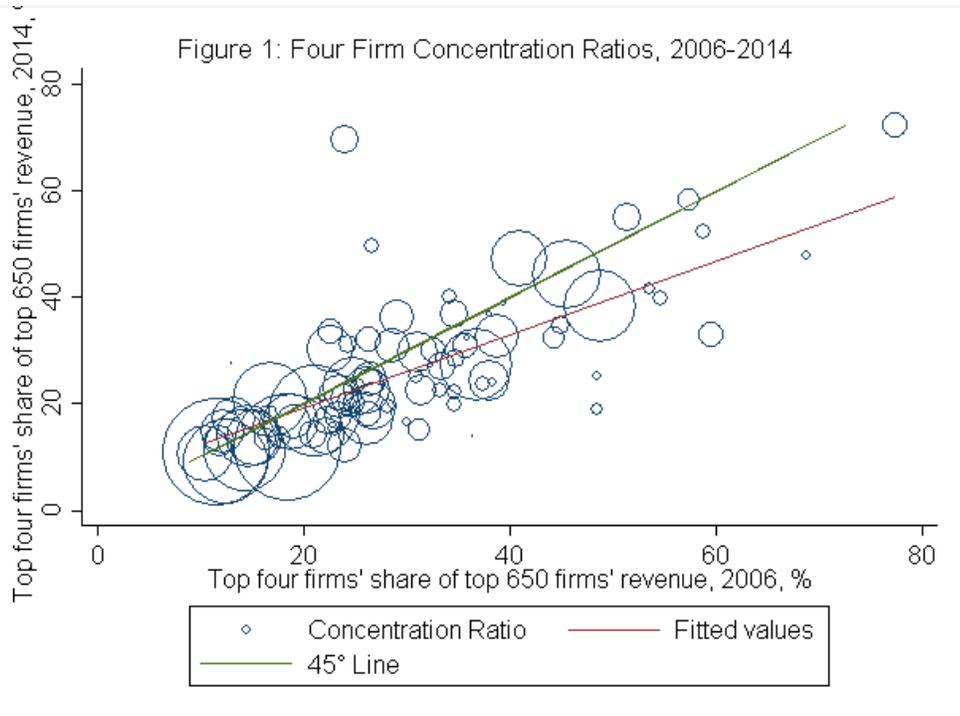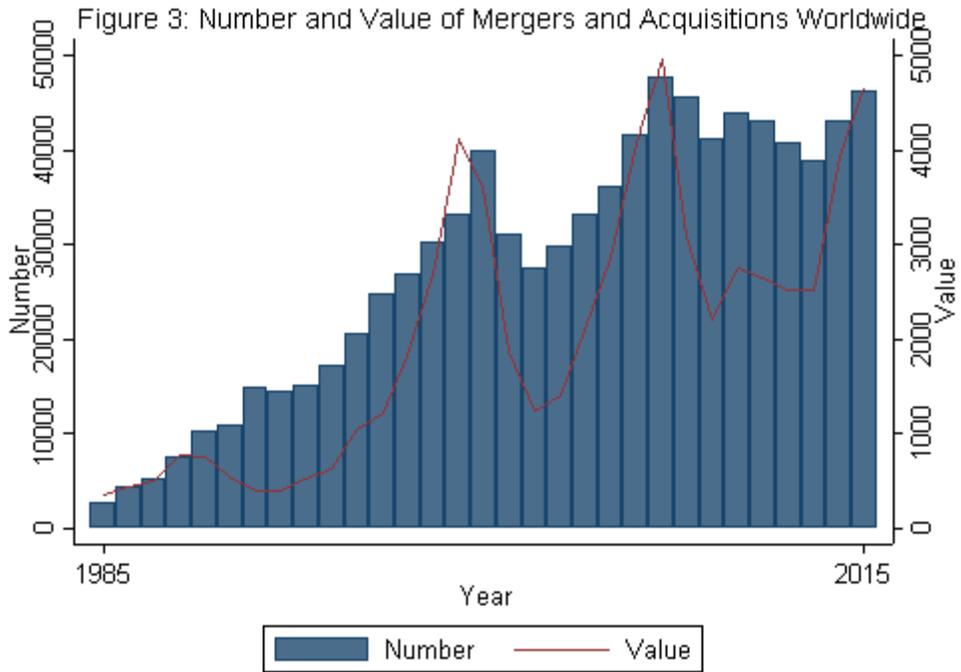
Source: Institute for Mergers, Acquisitions and Alliances, https://imaa-institute.org/statistics-mergers-acquisitions/

Appendix

Appendix A: Concentration and State-Owned Enterprises (SOEs)

Average Concentration	All Sectors	Sectors without SOEs	Sectors with SOEs
2006	30.6%	30.2%	32.6%
2014	26.6%	24.9%	31.1%
Average Change	-4.1%	-5.3%	-1.5%

Appendix B: Concentration and M&As

Average Concentration	All Sectors	Top 10 Sectors by M&A	Other Sectors
2006	30.6%	28.7%	31.2%
2014	26.6%	28.2%	26.1%
Average Change	-4.1%	-0.5%	-5.2%

Appendix C: Number and Value of M&A by Industry, since 1985

Largest number of mergers	Number	Highest value of mergers	Value (bil. USD)
Metals & Mining	48020	Banks	5013.9
Professional Services	45226	Oil & Gas	4639.4
Other Financials	34310	Metals & Mining	3006.0
Food and Beverage	33583	Pharmaceuticals	2621.2
Software	32997	Power	2592.4
Oil & Gas	32119	Telecommunications Services	2538.3
Building/Construction & Engineering	32089	Food and Beverage	2252.3
Banks	27407	Wireless	2099.2
Transportation & Infrastructure	26746	Insurance	2049.9
Machinery	25288	Transportation & Infrastructure	1936.8

	650	650	250	250	1000	1000
Appendix D1: Trade Growth and Concentration						
Change in Trade	0.023	-0.019	0.041	-0.021	0.009	-0.027
	(0.57)	(0.47)	(1.59)	(0.84)	(0.23)	(0.64)
EM Change		-0.075		-0.214		-0.22
		(1.97)*		(2.01)		(1.15)
Chinese SOEs		0.122		2.633		3.425
		(0.02)		(0.90)		(0.52)
M&As		7.266		3.064		8.883
		(1.84)*		(1.18)		(1.85)*
Initial Concentration	-0.263	-0.494	-0.222	-0.360	-0.251	-0.412
	(1.94)*	(3.28)***	(2.66)**	(3.86)**	(1.65)	(2.45)**
R^2	0.12	0.35	0.25	0.41	0.08	0.29
N	35	35	35	35	35	35

* $p<0.1$; ** $p<0.05$; *** $p<0.01$

	650	650	250	250	1000	1000
Appendix D2: Trade Growth and HH						
Change in Trade	0.002	0.000	0.002	0.001	0.000	-0.002
	(0.82)	(0.09)	(1.58)	(0.76)	(0.11)	(0.69)
EM Change		-0.001	-0.003	-0.014		-0.001
		(0.60)	(1.57)	(2.42)*		(0.91)
Chinese SOEs		-0.663	-0.473	0.345		-0.457
		(0.28)	(0.21)	(0.31)		(0.12)
M&As		0.290	0.239	-0.054		0.486
		(1.10)	(1.00)	(0.39)		(1.52)
Initial HH	-0.000	-0.000	-0.000	-0.000	-0.000	-0.001
	(1.45)	(1.65)	(2.26)*	(3.22)**	(0.90)	(1.33)
R^2	0.11	0.19	0.24	0.38	0.03	
N	35	35	35	35	35	35

* $p<0.1$; ** $p<0.05$; *** $p<0.01$