

Effects of Employee Allocation on Company Growth

1. Executive Summary

How does allocation of limited employee resources affect firms' growth, and how does fast growth force or enable certain employee allocation structures?

We show a clear but weak negative correlation between employee count and firm growth. That is, firms with fewer employees grow faster than those with more employees, as a whole. However, we have not yet been able to draw more detailed conclusions about firm structure or about the use of revenue due to a number of confounding factors. We explain these confounding factors and suggest a number of possible explanations for the apparent relationship between employees and growth. Finally, we address next steps for resolving the confounding factors and describe the implications of our results.

2. Background

The United States is experiencing a surge of interest in high-growth startups that has not been seen since the dot-com bubble. This interest has been spurred in part by popular stories about companies like Facebook, which had over one billion monthly active users and \$1.26 billion in quarterly revenue but just over 4300 employees at the end of Q3 2012 – approximately one employee for every 230,000 users, and \$290,000 in quarterly revenue per employee.¹ The classifieds site Craigslist famously has just “30-some staff” with well over \$100 million in revenue.² These companies have some of the largest numbers of customers of any business in the world, and are gaining startling sales growth from a relatively tiny employee base. We will

¹ <http://newsroom.fb.com/content/default.aspx?NewsAreaId=22>
<http://investor.fb.com/releasedetail.cfm?ReleaseID=715607>

² <http://www.craigslist.org/about/factsheet>
<http://aimgroup.com/2010/04/30/craigslist-revenue-profits-soar/>

examine what systemic changes, pressures, or firm structures, if any, contribute to small companies achieving large user or revenue figures for their industry.

One way to view historical changes in the structure of firm operations is with a diagram introduced by Eric Clemons in 1993:

Figure I. Firm Structures

		Coupling	
		Active	Passive
Ownership	Internal	Explicit Coordination	Consolidation/Integration
	External	Value-Added Partnership	Fragmented Market

Clemons' model describes how firm interactions have changed over time, moving from a fragmented market to vertical conglomerates to highly-coordinated internal integration and finally, thanks to information technology lowering the barrier to external coordination, to value-added partnerships.³ He describes fragmentation as “the idealized world described by Adam Smith” where the market is treated as fully liquid and the “costs of coordination” outweigh the benefits of diversification. The upper quadrants represent vertically integrated businesses enabled by technologies that reduce the costs of coordination. These are loose conglomerates in the passive-coupling case, where consolidation is a means of achieving economies of scale, and tightly integrated divisions in the active-coupling case, where integration is a means of reducing costs through coordinated inventory planning. The final quadrant, value-added partnerships, is a result of further improvements in information technology making it easier to plan with and trust third-party organizations that hold different positions in the value chain.

³ Clemons, Eric. *Information Technology and the Changing Boundary of the Firm: Implications for Restructuring*. Page 28. 28 September 1993.

An initial review of the diagram suggests that externally-owned firms are likely to have fewer employees, while internally-owned firms are likely to have more employees; and actively-coupled firms may have stronger inter-process planning even if the processes themselves are structurally independent, whereas coordination between the processes essential to the success of passively-coupled firms is typically much less. The relevant question for us is which firm structures catalyze rapid growth or are developed as a result of rapid growth. Information technology has made planning and coordination easier first inside and recently outside of the firm, but how high-growth firms allocate employee resources to take advantage of a rapidly changing technological environment is unclear.

Several questions arise about employees' responsibilities. Companies with high employee-to-sales ratios for their industry must use their employees more efficiently by definition, but do employees manage broad, modular areas, supervising virtual teams? Or, do they specialize and focus on exploiting core competencies where some insurgent technology allows them to have higher impact? Could they be merely lucky enough to be in winner-take-all industries with enormous economies of scale?

The most interesting question for us deals with entrepreneurs sizing market opportunities. When a company is under pressure to grow quickly, what are the advantages of a structure like the one described in the Value-Added Partnership quadrant?

The team behind a high-growth company is possibly the most critical aspect in the company's success.⁴ This research will evaluate how a specific team structure and responsibilities can encourage, discourage, or be a result of that success.

Possibly the most comprehensive related work comes from the University of Central Florida, where a thorough study of modern rapid-growth firms identified common attributes in four areas: "founder characteristics, firm attributes, business practices, and human resource management practices." This study found a number of factors which seem to go hand in hand

⁴ <http://www.emeraldinsight.com/journals.htm?articleid=873630&show=abstract>

with fewer employees managing broader areas. Though it did not directly address firm size, among the companies it examined, rapid-growth firms had substantially fewer employees than slow-growth firms.⁵ We explore this topic more deeply.

Other related work includes Melissa Schilling's efforts to build a "general theory of modular systems," which describes differences between industries that are more modular and those that are more integrated.⁶

3. Data and Methods

In order to match our hypotheses about firm structure to real-world businesses, we compared two major data sets. The first is information about the Inc 5000 companies, which is a list of the fastest-growing businesses in the United States that have been in existence for at least 3 years and have at least \$2 million in annual revenue.⁷ The second is information about the Fortune 500, a list of the largest companies in the United States by revenue.⁸ We used these two data sets to identify differences between the fastest-growing companies (the Inc 5000) and the companies that make up the bulk of the U.S. economy (Fortune 500 companies made almost \$12 trillion in revenue in 2012, while the entire US GDP was about \$16 trillion.) Summary statistics on each data set, broken down by industry, are provided below:

⁵ <http://www.olim.org/wiki/uploads/Articles/Barringer2005CharacteristicsRapidGrowth.pdf>

⁶ <http://people.stern.nyu.edu/mschilli/modular%20orgs.pdf>

⁷ <http://www.inc.com/inc5000/list/2012>

⁸ http://money.cnn.com/magazines/fortune/fortune500/2012/full_list/

Figure II. Inc 5000

Industry	Count	Mean Revenue	Mean Growth	Mean Employees	Revenue Per Employee	Growth Per Employee
Advertising & Marketing	418	\$16,030,383	472%	80.25	\$288,192	17.38%
Business Products & Services	576	\$91,679,340	197%	397.21	\$381,318	7.65%
Computer Hardware	44	\$63,222,727	192%	114.86	\$634,244	4.80%
Construction	152	\$50,760,526	373%	120.72	\$433,535	22.21%
Consumer Products & Services	240	\$88,520,417	564%	310.45	\$460,938	25.93%
Education	80	\$15,586,250	412%	142.83	\$262,648	37.91%
Energy	101	\$145,980,198	881%	244.86	\$824,450	25.68%
Engineering	76	\$18,369,737	137%	105.57	\$192,536	3.41%
Environmental Services	68	\$33,166,176	237%	248.09	\$272,852	6.73%
Financial Services	245	\$31,773,878	597%	152.20	\$381,828	17.57%
Food & Beverage	136	\$260,127,941	296%	1,541.59	\$566,733	9.41%
Government Services	261	\$29,157,088	450%	130.34	\$300,836	10.84%
Health	375	\$60,450,667	318%	544.54	\$269,263	9.11%
Human Resources	170	\$51,720,000	211%	558.36	\$422,471	9.39%
Insurance	66	\$39,460,606	381%	155.94	\$396,818	11.23%
IT Services	704	\$38,614,347	285%	149.49	\$291,016	11.84%
Logistics & Transportation	153	\$75,769,281	268%	223.87	\$645,877	16.30%
Manufacturing	248	\$74,579,839	131%	204.04	\$458,383	6.18%
Media	58	\$81,558,621	512%	119.91	\$339,287	25.80%
Real Estate	67	\$20,646,269	562%	149.36	\$418,853	17.22%
Retail	187	\$62,309,091	432%	392.40	\$406,325	23.02%
Security	75	\$40,662,667	345%	495.77	\$333,155	6.22%
Software	319	\$24,767,398	424%	151.65	\$174,654	9.06%
Telecommunications	147	\$89,214,966	287%	279.74	\$811,623	12.60%
Travel & Hospitality	35	\$131,337,143	162%	1,001.74	\$548,499	10.31%
Overall	5001	\$59,874,185	355%	290.64	\$377,984	13.38%
Sum	5001	\$299,430,800,000	1774915%	1,451,149.00	\$1,887,275,979	66811.13%
Highest	IT Services	Food & Beverage	Energy	Food & Beverage	Energy	Education
Lowest	Travel & Hospitality	Education	Manufacturing	Advertising & Marketing	Software	Engineering
Industry Mean	200.04	\$65,419,622	365%	320.63	\$420,653	14.31%
Industry StdDev	169.54	\$53,117,538	174%	327.61	\$171,057	8.45%

Figure III. Fortune 500

Industry	Count	Mean Revenue	Mean Growth	Mean Employees	Revenue per Employee	Growth per Employee
Advertising & Marketing	2	\$10,443,550,000	2.29%	56,300.00	\$181,754	0.00%
Business Products & Services	5	\$9,747,280,000	9.98%	34,680.00	\$296,896	0.00%
Computer Hardware	18	\$27,519,305,556	208.53%	66,845.72	\$522,008	0.00%
Construction	5	\$25,095,260,000	5.10%	54,059.80	\$441,217	0.00%
Consumer Products & Services	34	\$13,568,629,412	4.23%	24,182.09	\$674,858	0.00%
Energy	42	\$40,403,528,571	6.98%	17,499.76	\$2,941,657	0.00%
Engineering	25	\$12,494,828,000	5.91%	28,270.56	\$586,820	0.00%
Environmental Services	16	\$10,700,156,250	-17.87%	14,721.81	\$1,088,340	0.00%
Financial Services	38	\$32,379,594,737	60.65%	57,629.13	\$3,711,528	0.03%
Food & Beverage	39	\$25,265,851,282	8.70%	90,682.28	\$510,003	0.00%
Government Services	14	\$25,182,885,714	-0.14%	75,750.00	\$321,966	0.00%
Health	43	\$20,914,297,674	22.76%	38,331.77	\$841,385	0.00%
Human Resources	4	\$12,670,300,000	3.40%	73,425.00	\$411,406	0.00%
Insurance	34	\$25,250,197,059	49.79%	26,753.97	\$1,546,925	0.00%
IT Services	11	\$24,479,436,364	26.41%	80,501.91	\$522,741	0.00%
Logistics & Transportation	17	\$12,626,600,000	5.05%	54,780.47	\$358,433	0.00%
Manufacturing	12	\$12,208,866,667	-0.60%	38,577.42	\$3,096,832	0.02%
Media	10	\$16,621,240,000	-4.04%	41,475.00	\$552,289	0.00%
Real Estate	2	\$5,457,550,000	4.87%	17,109.50	\$11,509,317	-0.01%
Retail	66	\$27,360,584,848	15.78%	87,609.38	\$1,918,817	0.01%
Software	3	\$37,251,666,667	26.65%	72,200.00	\$479,924	0.00%
Telecommunications	26	\$23,270,542,308	19.63%	50,417.31	\$495,270	0.00%
Travel & Hospitality	34	\$20,910,305,882	38.31%	56,816.47	\$406,479	0.00%
Overall	500	\$23,500,512,000	25.46%	51,735.50	\$1,374,822	0.00%
Sum	500	\$11,750,256,000,000	12732.12%	25,867,749	\$687,411,085	2.15%
Highest	Retail	Energy	Computer Hardware	Food & Beverage	Real Estate	Financial Services
Lowest	Advertising & Marketing, Real Estate	Real Estate	Environmental Services	Environmental Services	Advertising & Marketing	Real Estate
Average	21.74	\$20,514,019,889	21.84%	50,374.75	1,470,993.65	0.00
Standard Deviation	16.98	\$9,255,654,433	44.42%	23,164.88	2,426,042.57	0.00

We broke down the data by industry because each industry has different employment characteristics. The “Food & Beverage” industry, for example, has the highest number of

employees per company in both sets of data, likely because it is heavily service-based (Walgreen, for example, has approximately 211,500 employees across all its stores). We used the categories given by the Inc 5000 and converted Fortune 500 categories to match.

Immediately upon comparison there are several striking characteristics of the data. For example, among the Inc 5000, the “Education” sector has the highest revenue growth per employee but the lowest mean revenue per company, while there are no Education companies in the Fortune 500 at all. Somewhat surprisingly given common perceptions, “Software” companies have the lowest revenue per employee among the Inc 5000 – but this is actually a result of coding, since many software-driven companies are in different categories (e.g. Facebook is categorized as a “Media” company). Notice also that there are 5001 companies in the Inc data; for reasons unknown, there are actually two companies at position 1241.

In order to extract useful conclusions from the data, we attempted to develop regressions to compare revenue per employee and revenue growth per employee for the three-year period ending in 2012. We recognize that there are many barriers to doing so effectively, and a number of caveats exist for the conclusions we found. We will discuss these conclusions and their qualifications in the next sections. For comparison, plots describing the overall data are included below.

For both Fortune 500 charts, INTL FCStone was excluded due to its growth per employee significantly skewing the results. For the second Fortune 500 chart, Apple was also excluded due to its extraordinarily high growth. In the first Inc 5000 chart, Publix, CDW, and The Invisible Close were excluded as outliers; in the second, Global Service Solutions, Unified Payments, Astrum Solar, and Edge Solutions were excluded. These plots are for all companies in each data set, but the shape of the data remains similar for most industries. Note that the Inc 5000 data has a similar shape as the upper half of the Fortune 500 data; this is due to the fact that the Inc 5000 data by definition consists of companies with positive growth.

Figure IV.

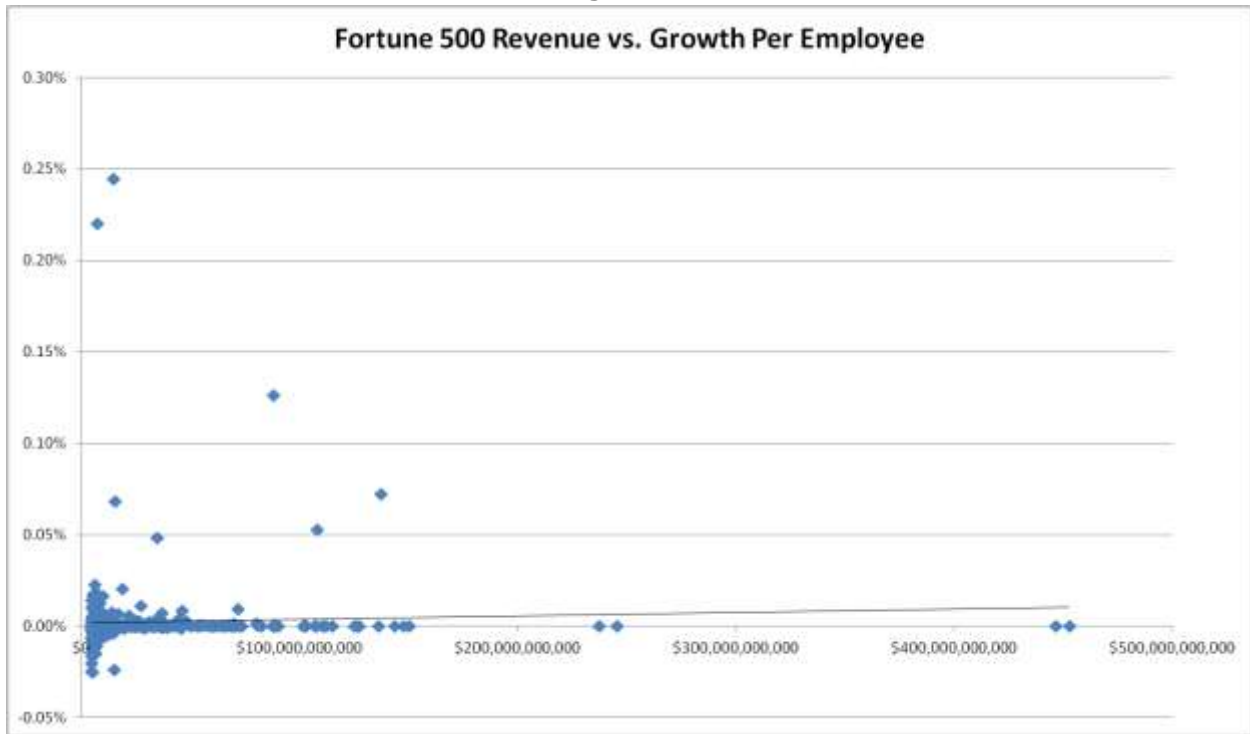


Figure V.

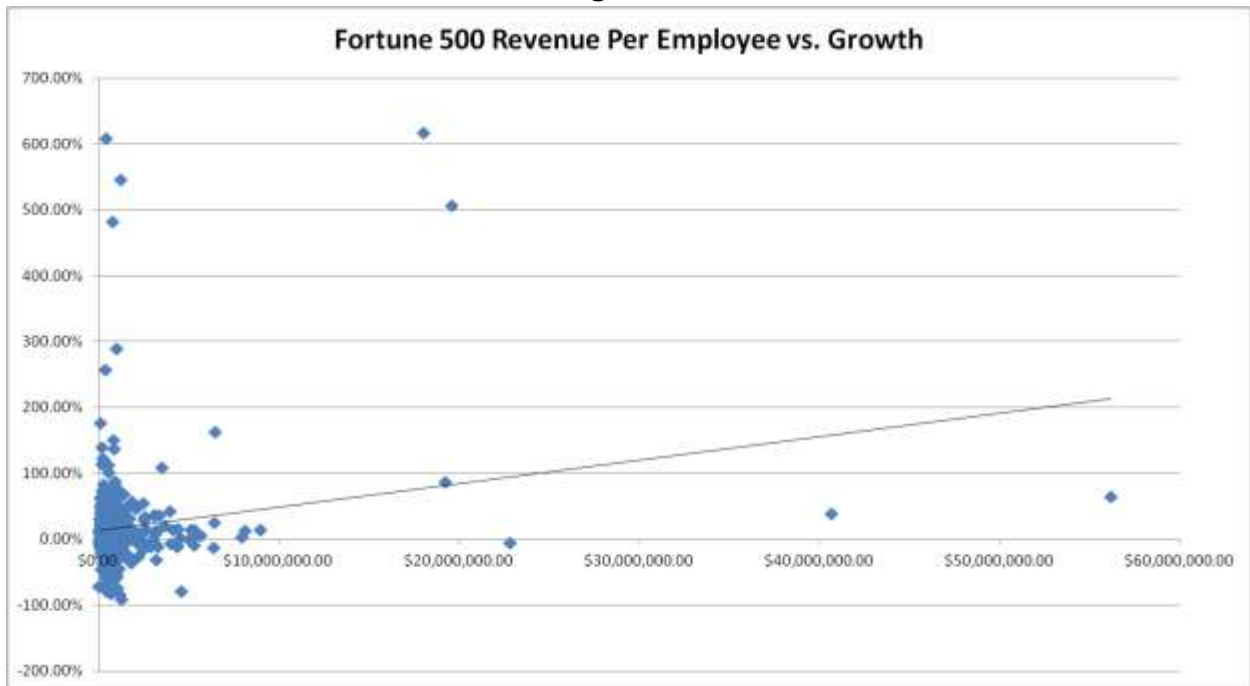


Figure VI.

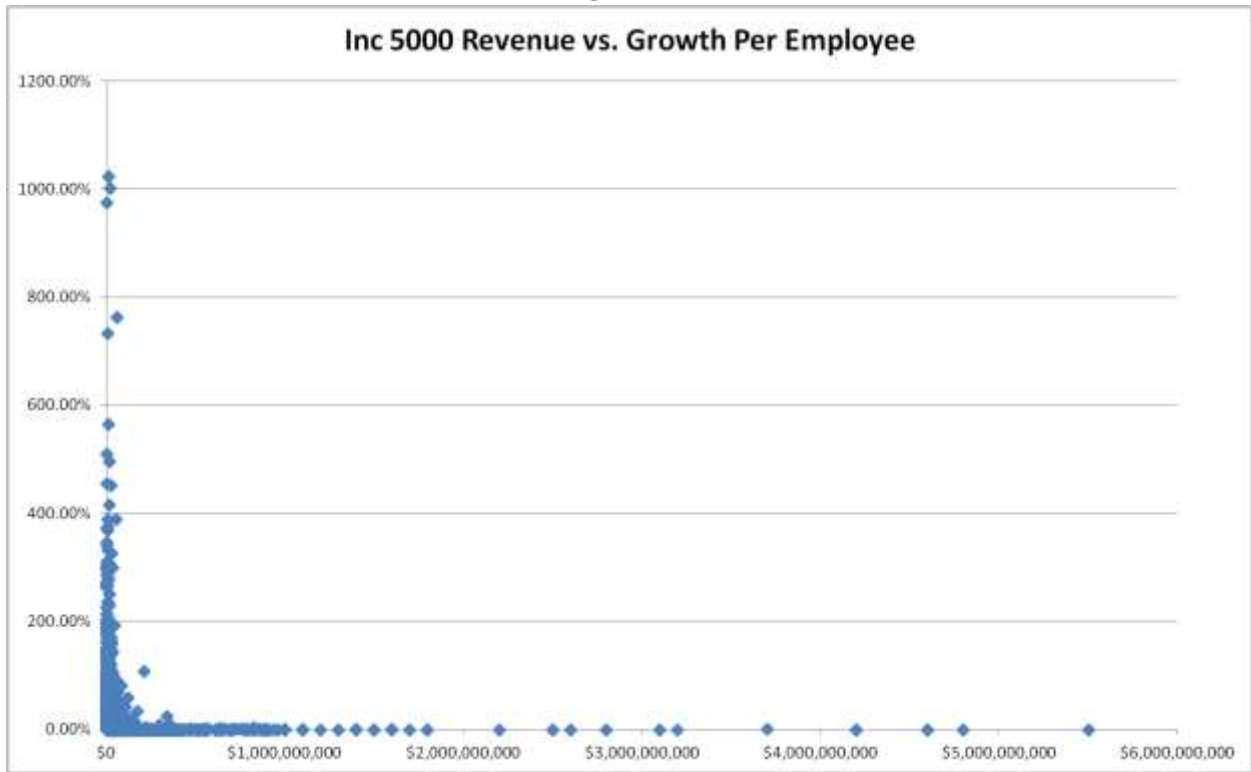
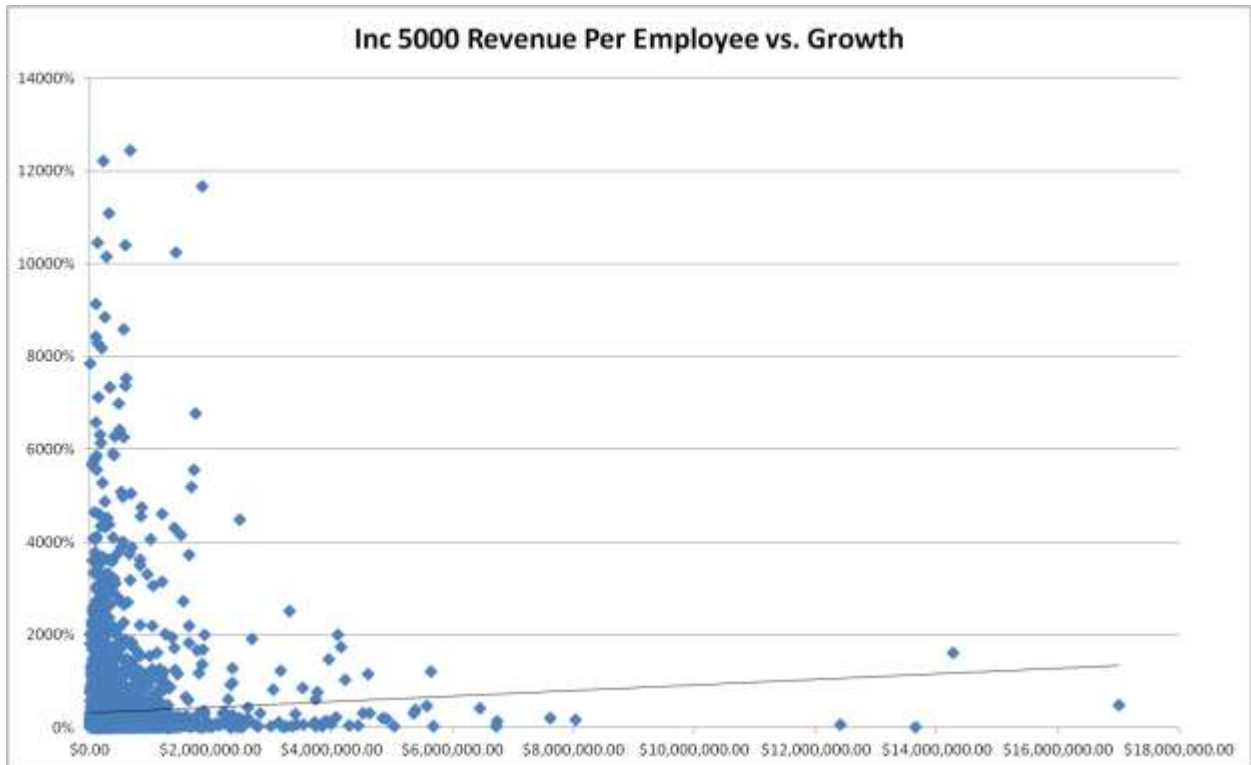


Figure VII.



We used charts like these for each of the 25 industries we examined in order to help draw conclusions about the relationship between growth and employee count. We further attempted to control for various factors discussed below, but there are a number of difficult confounding factors that complicated more detailed investigation. Proposals for overcoming these difficulties are discussed at the end of this paper.

4. Results

Our results, both overall and for each industry, and after attempting to control for a number of factors, show a clear but weak negative correlation between employee count and firm growth. That is, firms with fewer employees grow faster than those with more employees, as a whole. However, we have not yet been able to draw more detailed conclusions about firm structure according to *Figure 1* or about the use of revenue due to a number of confounding factors. These limitations make it difficult for us to offer actionable recommendations to executives attempting to grow their businesses, though plans for how to identify these recommendations are outlined at the end of this paper.

Confounding factors we encountered include:

A. Differences in employee activities across industries

We controlled for industry in our examination of the data, using the 25 industry categories used by the Inc 5000. We found that most industries show the same relationship between employees and growth as the overall data, although the absolute numbers change significantly depending on common employee activities. For example, “Food & Beverage” companies typically have many more employees than “Environmental” companies, but the correlation between employees and growth holds nonetheless.

B. Use of capital

Some businesses have unusually high transaction costs, such as logistics

companies that need comprehensive in-house shipping capabilities, or companies with intense R&D programs. Companies that use their capital on non-revenue-generating activities will naturally have lower revenue-to-employee ratios, skewing our results. On the flip side, some companies may simply do less work, which would raise their revenue per employee. Overcoming this limitation will require surveying businesses in more detail.

C. Organizational Structure and Decision-Making

Although our data shows how many employees each company has, it does not show the organizational structure. Enterprises with many virtual employees will have higher revenue per actual employee; decisions made at lower levels of management may indicate more organizational flexibility and ability to coordinate activities across the boundaries of the firm; and compliance/ethics monitoring may slow decisions such as hiring and outsourcing. This is a major area of focus for the potential next steps of this investigation because of the implications for executives structuring their businesses.

D. Hiring Practices

We have not established to what extent revenue per employee is an indicator of rapid hiring. High-growth companies may simply be unable to hire quickly enough to keep up with their growth. Alternatively, high-growth companies may benefit more from hiring generalists who can cover more roles, rather than hiring many specialists; this would indicate that type rather than number of employee has a stronger causal relationship with firm growth.

E. Hidden Data

Unfortunately, we only have data on companies that are still operational. It may be the case that extreme hiring practices or unusual employee structures produce extreme results on both ends of the spectrum, with both spectacular

failures as well as successes. Along the same lines, we are only able to partially control for company size; our results would hold more confidence if we could compare fast-growth companies of a given size against slow-growth companies of the same size. We used Fortune 500 as our basis of comparison, but given that these companies make up about 75% of the U.S. economy, it may be difficult for them to grow much faster than the economy regardless of organizational structure.

We expect our conclusions to remain consistent even taking into account these constraints, but further analysis is required in order to establish this. Even controlling for industry, state, and some size restrictions, there are simply too many variables that affect the relationship between employees and growth for us to control for all of them with the data we have collected to date.

5. Possible Explanations

We expected to find that a changing business environment has enabled large businesses to maintain fewer employees, possibly by moving some types of work outside the boundaries of the firm in accordance with the Value-Added Partnership structure, and that such a structure is advantageous to high-growth companies. Although we encountered several challenges, we believe our results are in line with this view. Preliminary interviews and a review of related literature suggest a number of possible explanations for conditions that could enable this employee leverage:

A. Open Source technologies let companies cheaply take advantage of the work of many more people than the firm itself has the resources to employ.

Much prior work has established that open-source software reduces the cost of information infrastructure while also reducing vendor lock-in. One way to view open source software is via John Koenig's Optimization Strategy model, which

applies Clayton Christensen's "law of conservation of modularity" to suggest that open source works like an unprofitable commodity that enables higher margins on "adjacent software layers."⁹ In other words, by utilizing the efforts of the crowd, the firm's employees may be able to focus more on delivering value and less on building supporting infrastructure.

B. Information technology has improved firms' ability to manage on-demand outsourced teams working on core processes across the boundary of the firm, allowing internal resources to be streamlined.

It is now possible to outsource manufacturing, customer service, marketing, human resources, distribution, and even R&D – almost every core firm activity.¹⁰ Changes in the technology used to manage such outsourcing and the associated planning may enable companies to separate their core activities and focus on the ones they do best, leaving a smaller employee base. Firms with fewer employees may operate as a management team that moves certain kinds of work to third parties, or they might simply outsource an entire business activity. As a result of the nature of these employees' work, these firms might have a structural focus on growth activities. Prior research shows that outsourcing often offers favorable speed and cost relative to developing necessary expertise in-house; less problematic capacity constraints; and sometimes additional decision-making flexibility.¹¹ Note that we define outsourcing here as "the performance, by outside parties on a recurring basis, of tasks that would otherwise be performed in-house" (as opposed to procurement).¹² We distinguish between outsourcing and

⁹ http://riseforth.com/pdf/seven_open_source_business_strategies.pdf

¹⁰ http://cogprints.org/7804/1/MPRA_paper_26989.pdf

¹¹ http://www.cio.com/article/29423/The_Build_Buy_Battle_Risks_and_Rewards_of_Outsourcing
<http://jom.sagepub.com/content/26/4/763>

¹² <http://www.jstor.org/stable/10.2307/4165567>

the use of open-source software because outsourcing usually refers to an approach to cost-cutting that moves existing activities outside of the firm.

C. Increasing specialization, enabled by increased access to market data by both the firm and its customers, is changing strategic design, marketing, and sales requirements.

Information technology has made it easier than ever to reach both a huge audience and a niche audience. As a result, companies may be able to expend less effort on trying to satisfy the average customer and instead only invest in activities that satisfy a specific target audience. For example, resonance marketing may be achievable with fewer employees at lower cost via so-called “word of mouse.”¹³

D. Resource-limited firms need employees who know how to get everything done, even if they don’t know how to do it themselves.

Early-stage high-growth companies often lack personnel with experience in every important core activity simply due to size and resources. For example, a founding team might be engineering-focused but lacking in sales expertise. These companies value employees who can figure out how to make things work even when they’ve never encountered such a task before. Employees with broad skills and those who are able to successfully delegate work outside of the firm without losing the advantages of active coupling may be the type of employee that can make a large impact on a small organization. In particular, firms may find that with fewer employees, those employees are pushed to find ways to improve efficiency and aggressively experiment to find methods that meet customer needs effectively. Experimentation has been shown to be a key factor in private

¹³ Dellarocas, C. The digitization of word-of-mouth: Promise and challenges of online feedback mechanisms. *Management Science*. 49, 10 (October 2003), 1407–1424.
http://www.forbes.com/2007/12/11/consumer-internet-buying-oped-cx_ekc_1212webbuying.html

wealth creation.¹⁴ Bloating the organization may result in employees following routines, limiting innovation.

E. Rapid growth breaks things.

Companies that are growing rapidly must also often change rapidly to meet the challenges of serving an order of magnitude more / bigger customers or a different customer segment.¹⁵ Changing requires flexibility, and maintaining a large organization in this environment could result in unhealthy entrenchment or needing to fire an entire division or product team when something doesn't work.¹⁶ A smaller group of more diverse employees could mitigate these challenges.¹⁷ In fact, one of the advantages of modular organizations is the ability to "redeploy resources... as firms exit some markets while entering others," and this redeployment can happen more smoothly when there are fewer people to rearrange.¹⁸

F. Small teams improve internal communication and culture.

When teams grow too large they often lose a sense of cohesiveness and the ability to communicate effectively. In contrast, small teams can often maintain better communication and develop stronger culture as a result. Stronger culture has been shown to catalyze faster growth.¹⁹ Additionally, employees of high-growth companies with strong culture may associate team performance more

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http://sid.decon.unipd.it/materiale10/belussi_mat_ecogestserv_11_12/Dynamic+Capabilities+and+Strategic+Management.pdf

¹⁵ <http://www.gabrielweinberg.com/blog/2013/01/orders-of-magnitude.html>

http://onlinelibrary.wiley.com/doi/10.1111/j.1467-9310.2008.00527_1.x/full

¹⁶ <http://www.jstor.org/stable/10.2307/256994>

¹⁷ <http://inderscience.metapress.com/content/0506531475732t6t/>

¹⁸ <http://digitalstrategies.tuck.dartmouth.edu/assets/images/HelfatDiversification.pdf>

¹⁹ <http://www.jstor.org/stable/10.2307/40229157>

strongly with personal success, which is positively associated with better performance.²⁰

6. Next Steps

We have established a clear but weak correlation between company growth and the number of employees, but we would particularly like to investigate the relationship between the activities these employees perform and company growth. That is, we would like to know why this correlation exists, and how it affects firm structure (or is affected by firm structure) in a way that executives can control.

To accomplish this, the next step is to survey companies in our data set to determine how they use their employees – whether they coordinate activities across the boundaries of the firm using many virtual employees, or whether they manage most activity in-house. This will help us resolve the most important unaddressed confounding factors (B, C, and D) in the *Results* section above. We have already begun planning how we intend to do this.

7. Importance and Implications

Developing an understanding of how employee structure affects firm growth and vice versa has a number of benefits. Most evidently, results could impact how high-growth companies organize themselves, recruit candidates for certain skills, and make decisions about how to use technology to empower their employees. For potential employees, a corporate focus on being lean and nimble could mean protracted unemployment issues, or at least a shift in the skills required for success. Investors may gain another signal in evaluating a firm's prospects.

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