A SUPPLEMENTARY NOTE ON PRODUCTIVITY.

In a recent article by Tyler Durden (10th July) titled: *Which Companies Generate the Highest Revenue per Employee?,* the following useful tables were included. https://www.zerohedge.com/news/2018-07-10/which-companies-generate-highest-revenue-employee

The first table lists those corporations with the highest revenues per employee **(RPE)**.

Table 1.

Top 50 S&P 500 Companies with Highest Revenue Per Employee (2017) Craft

Rank		Company	RPE 2017 (m)	Growth 2016-2017	Industry
▲	1	Valero Energy Corporation	$9.4	24%	Energy
▼	2	AmerisourceBergen	$7.7	-1%	Healthcare
▲	3	Phillips 66	$7.2	26%	Energy
▲	4	Brighthouse Financial Inc	$5.4	n/a	Financials
▲	5	Everst Re Group	$5.2	0%	Financials
▲	6	ONEOK	$4.9	32%	Energy
▲	7	Cardinal Health	$4.6	1%	Healthcare
▲	8	EOG Resources	$4.2	46%	Energy
▲	9	Cabot Oil & Gas Corporation	$3.8	88%	Energy
▼	10	Express Scripts Holding Comp	$3.8	-4%	Healthcare
▼	11	Exxon Mobil Corporation	$3.4	10%	Energy
▲	12	Range Resources Corporatior	$3.4	134%	Energy
▼	13	Altria Group	$3.1	-1%	Consumer Staples
▲	14	Chesapeake Energy Corporat	$3.0	24%	Energy
▲	15	ConocoPhillips	$2.9	56%	Energy
▼	16	Devon Energy Corporation	$2.8	17%	Energy
▲	17	Chevron Corporation	$2.7	32%	Energy
▲	18	Anadarko Petroleum Corpora	$2.7	55%	Energy
▼	19	Gilead Sciences	$2.6	-23%	Healthcare
▲	20	Hess Corporation	$2.6	24%	Energy
▼	21	LyondellBasell Industries	$2.6	15%	Materials
▼	22	McKesson	$2.5	-9%	Healthcare
▲	23	CBOE Holdings	$2.5	111%	Financials
▲	24	Andeavor	$2.4	-37%	Energy
▲	25	Concho Resources	$2.2	43%	Energy
▼	26	Netflix	$2.1	13%	Consumer Discretionary
▲	27	Cimarex Energy	$2.1	44%	Energy
▼	28	Marathon Oil	$2.1	-6%	Energy
▼	29	Archer Daniels Midland Comp	$1.9	-1%	Consumer Staples
▼	30	Aflac	$1.9	-13%	Financials
▲	31	Apache Corporation	$1.9	33%	Energy
▲	32	Noble Energy	$1.9	22%	Energy
▼	33	Apple	$1.9	0%	Information Technology
▲	34	NRG Energy	$1.8	27%	Utilities
▼	35	PulteGroup	$1.8	7%	Consumer Discretionary
▼	36	D.R. Horton	$1.8	4%	Consumer Discretionary
▼	37	Newfield Exploration	$1.8	18%	Energy
▼	38	Celgene Corporation	$1.7	11%	Healthcare
▲	39	Marathon Petroleum Corpora	$1.7	21%	Energy
▼	40	Biogen	$1.7	9%	Healthcare
▲	41	EQT Corporation	$1.6	84%	Energy
▼	42	Facebook	$1.6	0%	Information Technology
▼	43	Anthem	$1.6	0%	Healthcare
▲	44	Monster Beverage Corporatic	$1.6	38%	Consumer Staples
▼	45	XL Group	$1.6	9%	Financials
▼	46	Williams Companies	$1.5	11%	Energy
▼	47	Centene Corp	$1.4	8%	Healthcare
▲	48	Pioneer Natural Resources Cc	$1.4	34%	Energy
▲	49	Alexion Pharmaceuticals	$1.4	42%	Healthcare
▼	50	Lincoln National Corporation	$1.4	18%	Financials

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The second table lists the lowest revenue per employee. Predictably it is in the food and the serving sector.

Table 2.

Top 10 S&P 500 Companies with Lowest Revenue Per Employee (2017) Craft

	Rank	Company	RPE 2017 ($000s)	Growth 2016-2017	Industry
-	491	Aptiv Plc	$99.9	-13%	Consumer Discretionary
▼	492	Yum! Brands	$98.0	39%	Consumer Discretionary
▲	493	McDonald's	$97.1	48%	Consumer Discretionary
▼	494	Hanesbrands	$96.3	8%	Consumer Discretionary
▼	495	Accenture	$86.5	-5%	Information Technology
▼	496	Starbucks	$80.8	-4%	Consumer Discretionary
▲	497	Chipotle Mexican Grill	$65.0	7%	Consumer Discretionary
▲	498	Cognizant	$57.0	10%	Information Technology
-	499	Hilton Worldwide	$56.1	-19%	Consumer Discretionary
-	500	Darden Restaurants	$40.1	-13%	Consumer Discretionary

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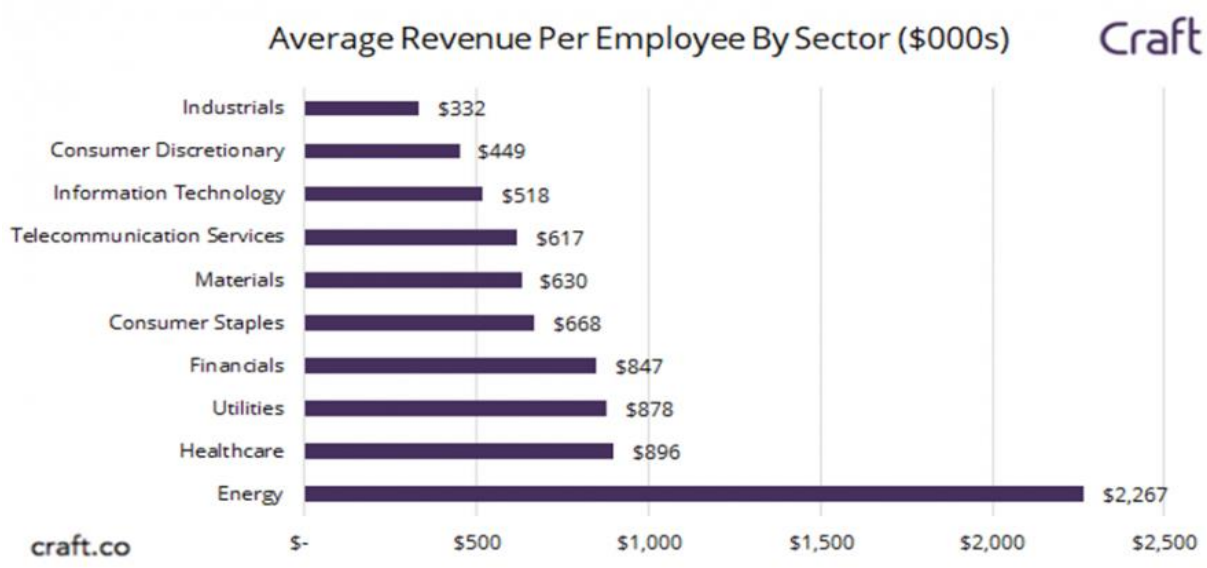
Of interest is the comparison between the bottom and the top corporations in terms of revenue per employee. The average for the top 5 corporations in Table 1 is $7 million. While the average for the bottom 5 in Table 2 is only $0.00006 million. The revenue attributable to the top 5 is thus 117 bigger than the bottom 5. Put another way, what takes a year in the low revenue corporations takes only two and a half days for the top corporations.

In determing the rate of productivity, revenue or ouput forms only one part of the equation. Therefore it must not be confused with “value added” which is the value of output less the cost of inputs. However, despite this qualification, the difference in size of the RPE indicates that workers in high RPE corporations play a larger role in the calculation of average productivity than do low RPE workers. More precisely, an increase in the productivity of these high RPE corporations will have a higher weight than in lower RPE corporations when determining average productivity rates and changes to them.

Table 3 below provides a more rounded RPE per industry for comparison. While the differential reduces, a differential of 8 to 1 remains.

Table 3.



The final graph relates to the so called motor of the economy, the high tech sector. Table 4 shows the growth in revenue per employee between 2014 and 2017. The first thing to note is that there has been no productivity growth for either Apple or Facebook. Only Alphabet as part of the FAANG group has shown any growth. Clearly the stratopheric rise in the share of Apple Corp, the world's most valuable corporation, cannot be attributed to the growing RPE of its workers, but instead to cost cutting (inputs) creative accounting and hype.

Table 4.

Top 20 Tech Companies by Revenue Per Employee (2014-2017) Craft

	Rank	Company	RPE 2017 ($000s)	RPE Growth	Revenue Growth	Employee Growth
-	1	Apple	$1,864	0%	6%	6%
-	2	Facebook	$1,619	0%	47%	47%
-	3	Alphabet	$1,384	10%	23%	11%
▲	4	Broadcom	$1,260	49%	33%	-11%
-	5	Visa	$1,224	15%	22%	6%
▼	6	VeriSign	$1,224	6%	2%	-4%
▲	7	HP	$1,062	8%	8%	0%
▼	8	Mastercard	$933	3%	16%	13%
▼	9	Lam Research	$853	9%	36%	25%
▲	10	NVIDIA	$843	26%	41%	12%
-	11	Applied Materials	$790	22%	34%	10%
▼	12	Microsoft	$725	-3%	5%	9%
▲	13	Activision Blizzar	$716	4%	6%	2%
▲	14	PayPal	$700	17%	21%	3%
▲	15	eBay	$679	-5%	7%	12%
▼	16	Qualcomm	$659	-15%	-5%	11%
▼	17	Cisco	$659	-1%	-3%	-1%
▼	18	Intuit	$631	6%	10%	4%
▲	19	Xilinx	$613	-4%	6%	11%
▼	20	Intel	$611	9%	6%	-3%

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Excluding financials like Visa, the average annual RPE growth per employee, adjusted by the GDP deflator, only amounted to 1.4%. This is not significantly higher than the average for the economy as a whole.

Completing the equation for productivity

The above comparisons are crude because of what is missed out. Only the "value" of output, not "value added" was being compared. To obtain value added the value of inputs needs to be determined and included. When they are deducted from the value of output, only then is the "value added" obtained which forms the numerator in the productivity equation. This equation is gross value added divided by the number of workers or hours.

As expected the difference between value added and revenue is greatest in the highest RPE corporations. This is due to inputs forming a larger share of output. To illustrate this relationship two corporations are chosen: Phillips 66 from Table 1 and Starbucks from Table 2. Phillips 66 is a corporation whose composition is above the average and Starbuck's which is below the average, or in the words of capitalist economists, Phillips 66 is "capital intensive" while Starbucks is "labour intensive" (all those baristas).

In the case of Phillips 66, its RPE of $7,200,000 is nearly one hundred times larger than Starbucks at $80,800 p.a. However, in the case of Phillips, the ratio of inputs to outputs is much higher than in Starbucks. For example, 76% of Phillips RPE is composed of the cost of the crude which Phillips refines or sells on. This is a much higher fraction of sales then the coffee beans, milk and sugar Starbucks

consume making Lattes and Cappuccinos. As a result, Phillips operating margin before Selling, General and Administrative expenses (2017) is only 6.7% compared to Starbucks' 60%. Therefore, for every dollar of sales, Phillips workers add only 6.7 cents, compared to 60 cents for Starbucks.

Of course, 6.7% of a $7.2 million RPE is much larger than 60% of $80,800. It is $482,400 of sales value per employee in Phillips versus only $48,480 in Starbucks. It seems, on the face of it, that it is much more profitable to pump oil instead of coffee, except that it is not. What is important is the rate of return. While Starbucks employed 300,000 workers worldwide (of which 157,000 in the USA), Phillips only employed 14,000, but whereas Starbucks only deployed $14.4 billion of total assets to employ these workers, Phillips deployed nearly four times as much or $54.4 billion. The amount of capital per worker in Starbucks was $48,000 while in Phillips it was $388,500 or 8.1 times more or even more when circulating capital adjusted for turnover is included.

It therefore follows that each of the 300,000 workers in Starbucks who work with $48,000 of capital, need produce a smaller quantum of profit than the 14,000 workers in Phillips who each work with $388,500 capital, if similar rates of profit are to be achieved. And this is the nub of the problem. The equalisation of the rate of profit via the pricing system ensures that value is transferred from the below average composition (labour intensive) industries to the above average composition (capital intensive) industries, or from Starbucks to Phillips. Starbucks sells its coffee at a price below its value and Phillips sells its oil at a price above its value. Its productivity is reduced while Phillips' productivity is enhanced.

In conclusion, it is the rise in the average composition of capital that is the driver of productivity and not the redistribution of value. And it is in these elevated RPE corporations where the rate of investment is highest. If the rate of productivity decelerates, this is often the result of a move to a service-based economy, one in which a preponderance of below average composition corporations now proliferates. They tend to be less productive, not only because they loose value through the pricing system, but because the amount of means of production they work with, or can be made to work with, is limited.

Addendum.

In a recent article on productivity titled: *MACHINE LEARNING: ITS PARADOXICAL AND UNEXPECTED EFFECTS ON PRODUCTIVITY* I listed 7 elements which effect productivity or their calculation. https://theplanningmotivedotcom.files.wordpress.com/2018/06/machine-learning-article-2-pdf.pdf

I omitted one. When the various statistical bureaus decided to change their treatment of R&D and in-house software in the National Accounts, this had the effect of raising both the absolute productivity of workers and their relative annual growth. These bureaus agreed to convert R&D and in-house software from an intermediate sale into a final sale. What was a cost before was now capitalised instead. This had the effect of reducing inputs and raising outputs, therefore increasing gross value added. In the case of the USA GDP was raised by about 3%. This meant that US workers were suddenly 3% more productive. Furthermore, in countries where R&D and software is growing relative to the rest of the economy, year by year, final sales will increase that much quicker, lifting productivity growth with it. In sum this methodological change has had the effect of inflating productivity growth.

Brian Green, July 2018