

Facts and Fictions about the Effect of the Pandemic on U.S. Manufacturing

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Abstract—The U.S. Department of Census released data from their 2021 Annual Survey of Manufactures (ASM). The Annual Survey of Manufactures (ASM) provides sample estimates of statistics for all manufacturing establishments. The ASM provides the best current measure of current U.S. manufacturing industry outputs, inputs, and operating status. Based upon analysis of the data from 2018, using 2019 as a base year since it was before the start of the pandemic, percentage changes for 2020 and 2021 were calculated in the manufacturing data. Analysis of these percentage changes over this time period show that many widely held beliefs about the severe negative impact on manufacturing activity and inventories in 2020 and 2021 are not supported by the actual data. A few beliefs were actually supported based upon analysis of these percentage changes.

Index Terms—U.S. Manufacturing Output Changes, Covid impacts on U.S. Manufacturing, U.S. Manufacturing Employees

I. INTRODUCTION

On December 15, 2022, the U.S. Department of Census released data from their 2021 Annual Survey of Manufactures (ASM). The Annual Survey of Manufactures (ASM) provides sample estimates of statistics for all manufacturing establishments with one or more paid employee. It is conducted annually, except for years ending in 2 and 7, at which time ASM statistics are included in the manufacturing sector of the Economic Census. The purpose of the survey is to provide key intercensal measures of manufacturing activity, products, and location for public and private sector use. The ASM provides the best current measure of current U.S. manufacturing industry outputs, inputs, and operating status, and is the primary basis for updates of the Longitudinal Research Database [1].

Based upon analysis of the data from 2018, using 2019 as a base year since it was before the start of the pandemic, percentage changes for 2020 and 2021 were calculated in the manufacturing data. Analysis of these percentage changes over this time period show that many widely held beliefs about the severe negative impact on manufacturing activity and inventories in 2020 and 2021 are not supported by the actual data. A few beliefs were actually supported based upon analysis of these percentage changes. The actual data from the U.S. Department of Census are included in Appendix A and calculations of percent change are discussed in the body of the paper.

The impact of the pandemic on manufacturing activity in the United States was of interest and concern to political leaders in the United States. The White House released written materials on why the pandemic disrupted supply chains [2]. The White House materials released June 17, 2021 stated that production lines of hundreds of thousands of small

businesses had been shut down. The ASM data which also includes small businesses in manufacturing shows that these shutdowns were not long lasting and not significant in reducing output inventories.

II. FINDINGS

Myth 1. U.S. Manufacturing activity dropped significantly resulting in a major decline in employees, their hours worked, and payrolls.

APCMAG reported at the start of the pandemic in March, 2020 that manufacturing output and employment sharply declined due to lockdowns and supply chain disruptions [3]. Advanced Technology Services magazine, reported in March, 2020 that manufacturing workers were restricted from entering facilities [4]. NPR.org also reported April, 2020 that factory employment fell sharply and large auto plants were forced to shut down [5]. These statements of sharp decline were valid at the pandemic's early point in time, but did not remain at a sharp decline level by the end of 2020 and 2021. In May, 2021 NAM.org reported that over 1.4 million manufacturing jobs were lost through the pandemic, leading to manufacturing shortages [6]. Another federal agency, the U.S. Bureau of Labor Statistics (BLS), presented in October, 2022 statements that were contradictory to the ASM data. BLS stated that the pandemic created a 43% drop in manufacturing rates and manufacturing hours worked by workers were impacted [7].

Actual data shows that the number of U.S. Manufacturing employees only dropped 2% in 2020 compared to 2019 and 2021 was only 3% less than 2019.

Actual data shows that hours worked per employee only dropped 4% in 2020 compared to 2019 and was only 1% less in 2021 compared to 2019.

Actual data shows that payroll costs for manufacturing

employees was only 1% less in 2020 compared to 2019 and that 2021 was 3% above the payroll costs in 2019.

The data does not support the false belief that, due to lockdowns and stay-at-home orders, most factories were forced to close.

Supported Belief 1. Manufacturing firms found it harder to get workers to show up to work their manufacturing jobs in person and they had to offer more financial incentives.

Unlike many office and technology jobs that could be done remotely, manufacturing jobs often required workers to leave the perceived safety of their homes to physically work at the manufacturing job site. McKinsey.com reported in April, 2020 that supply production decreased due to the lack of workers available and workers risked being fired for not showing up to work in factories [8]. CNN Business reported in May, 2021 that the pandemic had left the manufacturing industry with over half a million job openings that were hard to fill with workers [9]. CNBC reported that US manufacturing firms are looking to increase local manufacturing and inventories, leading to higher demand for US manufacturing employees [10].

The data showed that the average payroll cost per employee went up about 1% in 2020 compared to 2019 and payroll cost per employee went up 6.4% in 2021 compared to 2019.

The data showed that pay per hour worked for manufacturing employees went up 5.2% in 2020 compared to 2019 and pay per hour worked went up 7.6% in 2021 compared to 2019. This 7.6% rise in hourly pay for manufacturing employees helps to partially explain why the U.S. faced the highest inflation in 40 years in 2022.

The data shows there were fewer manufacturing employees in 2020 compared to 2019 and there were fewer manufacturing employees in 2021 compared to 2020. Those fewer employees are receiving greater compensation for their employment.

The data on employees being paid more per hour indicates that employers faced fewer applicants per job opening and thus responded to labor market demands with higher wages. An area for policy consideration is whether or not there was a severe need for manufacturing workers to have been given the high level of federal and state level pandemic financial relief incentives if jobs were available to those who chose to fill the jobs.

Myth 2. The pandemic had a long-lasting negative disruption on supply chains of U.S. Manufacturers.

The data indicates that there was an 11% drop in dollar value of input materials in 2020 compared to 2019; mostly due to the initial federal and state lockdown and social distancing restrictions. However, this was not long-lasting as 2021 saw a 4.5% in dollar value of input materials in 2021 over 2019. Some of this could be due to higher prices paid for the same quantity of material, but the belief that the

pandemic led to a significant continued lack of material availability in 2021 is a false myth.

The data shows that the dollar value of finished goods inventories at the end of 2020 was only 3% less than 2019 and that 2021 was about 9% above the 2019 dollar value of finished goods inventories. If there was a long-lasting supply chain disruption and lack of parts necessary, one would expect a significant drop in finished goods inventory.

At the start of the pandemic in April, 2020, the Global Trade Review predicted that the car industry would be the fastest to bounce back from the pandemic's shutdowns and global supply chain disruptions [11]. The actual data indicates that the continued computer chip shortage in the automobile manufacturing and electronics manufacturing industries in 2021 was the exception as manufacturing data shows other industries were not still suffering significantly with any supply chain disruptions.

Myth 3. The pandemic would have caused manufacturing firms to invest heavily in expensed computer hardware and other equipment.

The data indicates a 9% drop in expensed computer hardware and other equipment in 2020 compared to 2019 and a 3% drop in 2021 compared to 2019. One would expect that with the difficulty of getting workers to work in person at the manufacturing firms, there would have been more investment in computer hardware and other equipment to shift those jobs that could be done remotely and to replace some workers with automation.

Supported Belief 2. The pandemic would lead U.S. manufacturers to invest more in cloud migration and other software services.

The data indicates that there was a 2% increase in expensed purchases of software in 2020 compared to 2019 and a 15% increase in expensed purchases of software in 2021 compared to 2019. The pandemic accelerated the pre-pandemic trend of all firms moving towards more cloud migration and software services.

III. CONCLUSIONS

It is easy to be a Monday morning quarterback and look back in time to say what should have been done. As the data from the 2021 Annual Survey of Manufactures was just released December 15, 2022, we now see actual information to accurately see the impact that the pandemic had on U.S. manufacturing in 2020 and 2021.

It will still take about 12 more months to see the 2022 data. What is clear is that there are some widely held beliefs about the severe, sustained, long-term negative impacts of the pandemic on supply chains and U.S. manufacturing--- this study shows that the 2021 ASM data shows that most of these are myths not based in fact and only a few are actually supported. From a public policy perspective, it seems that there was little data available to federal and state legislators when they approved initial pandemic relief financial

incentives for firms and workers. By the start of 2021 and start of 2022 preliminary data should have been available to legislators that the pandemic did not have the severe long-lasting negative impact on U.S. manufacturing firms and their employees; this data would have questioned the need for supplemental relief packages approved in 2021 to benefit U.S. manufacturing firms and their employees. Congressional Research Services prepared an insight report in May, 2022 on the pandemic’s effects on US Manufacturing [12]. Hopefully, in the future, policy makers will examine all available statistical data on actual minor firm and employee impacts prior to approving major government relief effort funds.

Expensed computer hardware and other equipment (\$1,000)	% of 2019 base	Expensed purchases of software (\$1,000)	% of 2019 base
6,076,889	95.98	5,083,599	93.79
6,331,152	100.00	5,420,243	100.00
5,749,884	90.82	5,537,345	102.16
6,133,645	96.88	6,214,335	114.65

APPENDIX A. ACTUAL ANNUAL SURVEY OF MANUFACTURES DATA FROM U.S. DEPARTMENT OF CENSUS RELEASED DECEMBER 15, 2022

(note: the “% change from 2019” columns were added by this author to assess the pandemic’s impact on the variable; also any color shading was added by this author to highlight major % changes; some variables of lesser interest from the ASM tables were excluded in this study)

Yr	Payroll (\$1,000)	% of 2019 base	Number of employees	% of 2019 base	Average Payroll Cost per Employee	% of 2019 base
2018	692,979,103	98.39	11,633,292	100.81	\$59,568.62	97.60
2019	704,319,852	100.00	11,539,572	100.00	\$61,035.18	100.00
2020	695,674,024	98.77	11,305,224	97.97	\$61,535.62	100.82
2021	727,733,856	103.32	11,205,977	97.11	\$64,941.58	106.40

hours (1,000)	% of 2019 base	hr/employee	% of 2019 base	Pay/hr	% of 2019 base
16,162,235	100.43	1389.31	99.62	42.88	97.96
16,092,792	100.00	1394.57	100.00	43.77	99.99
15,110,782	93.90	1336.62	95.84	46.04	105.18
15,459,023	96.06	1379.53	98.92	47.08	107.55

wages (\$1,000)	% of 2019 base	benefits (\$1,000)	% of 2019 base	materials (\$1,000)	% of 2019 base
405,759,893	98.36	210,601,487	98.24	3,301,381,002	103.29
412,544,625	100.00	214,382,524	100.00	3,196,364,177	100.00
400,870,160	97.17	208,327,344	97.18	2,839,308,019	88.83
420,636,198	101.96	217,592,418	101.50	3,341,153,981	104.53

Value added (\$1,000)	% of 2019 base	Finished goods inventories, end of year (\$1,000)	% of 2019 base
2,606,338,235	101.58	246,195,924	98.02
2,565,739,847	100.00	251,160,030	100.00
2,361,053,349	92.02	243,935,121	97.12
2,789,460,427	108.72	273,747,599	108.99

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