Reshoring: Impact on the U.S. Economy

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Abstract

After decades of loss in manufacturing jobs, the recent trend has revealed that some production facilities are shifting their operations back into the United States. Job growth has been the focus of recent political and policy debates. The debate has rather intensified at the aftermath of the recent financial crisis during which the official unemployment rate has reached a staggering 10% at the peak of the crisis. The objective of this paper is to analyze potential factors which have an impact on the manufacturing production index in the U.S., using data from 2000 to 2012. Such variables as productivity, educational attainment, globalization, and business cycle have been found to exert a statistically significant impact on the manufacturing production index.

To gain a better understanding of the business decision of shifting production facilities, industry professionals were interviewed. The information gathered from the interviews reflects the prominent impact of technology and the level of training given to employees on business decisions to move their production facilities, a viewpoint consistent with my empirical results.

Keywords: Growth, manufacturing, reshoring, U.S.

Introduction

About 30 years ago, the idea of globalization blew up; bringing the number of employees in the manufacturing sector from 19.2 million to roughly 11.6 million in the U.S. (Ensinger, 2010). Looking back upon the United States history, manufacturing played a major role in shaping our society and our economy. A manufacturing plant is where everyone in a small town and people from surrounding towns worked. There was a since of community in these plants and pride. Americans were creating products for other Americans. The three words

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"Made in America" brought overwhelming pride to many folks. It was the robust manufacturing sector in the 30's that aided in pulling out the United States from the Great Depression.

However, after decades of loss in manufacturing jobs, the recent trend has revealed that some production facilities are shifting their operations back into the United States. This process of reversed outsourcing is referred to as reshoring. The topic has been the focus of recent political and policy debates. The debate has rather intensified at the aftermath of the recent financial crisis during which the official unemployment rate has reached a staggering 10% at the peak of the crisis. The recent moves of a few large manufactures, such as General Electric from China and Caterpillar from Japan to the U.S., has the media, politicians, and business people all wondering what reshoring entails for the country (*The Economist*, 2013). In line with that debate, President Barack Obama recently held a discussion with Harry Moser, to discuss his insourcing initiative to encourage U.S. companies to manufacture in the U.S. Moser told the president that the total cost to hold production overseas is greater than the costs many companies looked into, hence the shift of location back to the U.S. (Markowitz, 2013). Moser and other industry analysts† also state the gap in wages between the U.S. and China is depleting, leading to financial strains if the company were to continue hosting production overseas. These strains are pushing companies to reassess their Total Cost of Ownership (TCO) model. The TCO model is used to identify costs in all areas of the company. Examples include sourcing, production location, processing costs, and transportation of the finished goods (Markowitz, 2013). Other reasons for the shift of production location include proximity to customer, enhanced response times, lower complexity of supply chain, and lower transportation costs (Harrington, 2011).

The purpose of this study is to highlight the determinants of reshoring and the implications of the process to the U.S. economy.

The qualitative results indicate that through Total Cost of Ownership models, manufacturing true costs are being shown, exposing costs that seemed minor compared to the cost savings in wages when offshoring or outsourcing to another country. With the realization of added costs through additional taxes,

† *For example, Hohner, Sirkin and Zinser (2011) findings suggest that wages between U.S. and China have started to move toward equalization. Specifically, they conclude that the cost advantage of Chinese labor drop from 55 % to 39 %.*

tariffs, and lengthy lead times, companies are utilizing lean practices to cut costs, improve productivity, and reduce the overall cost of manufacturing.

The quantitative results indicate that reshoring has a positive impact on the United States economy through measures of globalization, productivity, and education. The economic model used in this study reflects how an increase in educational attainment, the productivity of plants, and international trade has a positive correlation with that of the manufacturing index.

The increase in productivity is in line with the results of globalization. As the plants in the U.S become more productive, they can increase the output of the plant, resulting in more goods to export.

Literature Review

Gross Domestic Product (GDP) as defined by the Bureau of Economic Analysis is "the output of goods and services produced by labor and property located in the United States" (U.S. Department of Commerce, 2013). Positive signs of improvement in the economy in terms of GDP would be an increase in exports and a decrease in imports. In 2012, $1.87 trillion was contributed to the economy due to increased manufacturing and $1.73 trillion in 2011 (National Association of Manufacturers). According to McMeekin & McMackin (2012), an estimated $100 Billion USD is expected to be added to the current GDP contribution from reshoring alone. A sign of this was reflected in a posting from the U.S. Census Bureau; it stated the national trade deficit in goods and services has decreased from $44.1 billion in May of 2013 to $34.2 billion in June as reported on August 6th (United States Census Bureau, 2013).

Manufacturers in the U.S. are actively enhancing current operations to win business from companies that are considering shifting production to the U.S. For example, Coating Excellence International invested in technology to enhance operations and give them a leg up on foreign competition (Katz, 2008). According to Acs and Audretsch (1990), small firms are able to compensate for their small capacity with the amount of innovation they contribute to the industry.

In order to boost the growth of manufacturing in the U.S., industry, labor, and political leaders believe imports would need to be limited through quotas, tariffs, domestic legislation or discriminatory preferences. However, many materials are

sourced from foreign suppliers for U.S. based manufacturers. Boeing, for example sources 30% of the components for their 787 Dreamliner from non U.S. suppliers. Kliesen and Tatom (2013) find a strong positive correlation between growth of manufacturing output and real good imports into the U.S.

The offshoring boom impacted sectors in which a majority, if not all positions, required minimal skill levels. Industries such as apparel knitting mills and textiles lost roughly 85% of their jobs (Wilkerson & Williams, 2012). By contrast, industries such as food processing, pharmaceutical manufacturing, machine shops, agriculture, construction , and energy machinery have been a few of the industries that have added jobs due to the higher skill set needed to be competent in the job as well as the need for resources to be in relative proximity of the production facility (Wilkerson & Williams, 2012).

How many jobs are coming back? According to the Bureau of Economic Analysis labor data, as cited in the National Association of Manufacturers, manufacturing supports 12 million jobs directly in manufacturing and 17.2 million jobs indirectly (National Association of Manufacturers, 2012). When taking into consideration the multiplier effect, which means that for every x job in one sector it contributes a y amount of jobs in another, there are 5.8 million professional service jobs such as accounting or consulting that depend on manufacturing positions (Manufacturing Institute).

According to the Manufacturing Institute, when companies were asked, in which employee segment do they experience the most shortages, 83% of companies said that they were facing a moderate-to-serious shortage in skilled production positions such as machinists, operations, craft workers, distributors, and technicians. Many manufacturing sector job openings are unfilled because of a greater skill requirement (Rich, 2010).

Methodology

Using a mixed method approach, this study analyzes the determinants of reshoring in the U.S. manufacturing sector.

In the qualitative portion of the paper, professionals in a management position were interviewed from three different companies located in the Midwest. Discussions were held about the manufacturing sector in general and the trends for the past five years. The interview questions are presented in the

appendix section.

To explain the change in manufacturing output in the U.S., the following model was developed:

Manufacturing Production Index=
a_0+a_1 *Globalization*$+a_2$ *Manufacturing productivity*$+a_3$ *education*$+a_4$ *manufacturing job growth rate*$+a_5$ *time*$+a_6$ *business cycle*$+\mu$

Where globalization equals the value of U.S. exports plus the value of U.S. imports divided by GDP; manufacturing productivity equals the value added to GDP by manufacturers divided by GDP; education equals the percentage of the United States population with bachelor's degree; manufacturing job growth rate equals the present employment level minus the past employment level divided by the past employment level; time refers to time trend. The period spans 2000-2012; business cycle equals 1 if the U.S. was in a recession during that year, and zero otherwise; μ is an error term with mean of zero and variance of 1.

Manufacturing productivity data was collected from the Bureau of Economic Analysis, the business cycle data was collected from the National Bureau of Economic Research, educational data was obtained from the Census Bureau, Manufacturing job growth rate was determined from data derived from the Bureau of Labor Statistics, and the globalization data was collected from the Bureau of Economic Analysis.

Globalization in this study was defined as the value of United States imports + Value of U.S. exports/GDP. According to the results, as the value of our exports goes up, the Manufacturing Production Index (MPI) goes up, increasing the impact of manufacturing on GDP.

The variable time trend reflects the evolution of the manufacturing sector as explained by other variables not accounted for in our model.

The descriptive statistics of the data used in this study are summarized in Table 1.

Table 1: Descriptive Statistic

Variable	Minimum	Maximum	Mean	Standard Deviation
Industrial Production	91.568	104.976	97.713	4.168
Globalization	22.864	31.551	27.061	3.068
Education	0.122	0.151	0.137	0.00883
Business Cycle	0.000	1.000	0.231	0.438
Manufacturing Job Growth Rate	-0.130	0.0180	-0.0195	0.0445
Labor Productivity	0.110	0.125	0.118	0.00554

The terms reshoring, backshoring, onshoring, and insourcing will be used interchangeably. According to the Council of Manufacturing Association, 2012, these terms are defined as "bringing back manufacture of products that will be sold or assembled here". Understanding why businesses are moving back to the U.S. and what they are doing to transition production will aid in answering the research question, what economic impact does reshoring have on the U.S. economy.

The limitations to this study were time and location. The time limited the number of interview participants and the location was limited to those who are currently working for a company in the Mid-West, but has global ties.

We made two assumptions in this study. Specifically, statements made by the interviewed candidates are generalized for those businesses stated, and that educational attainment refers to degrees that are directly transferable to the skill set required for any position in a production setting.

Results

Qualitative Results:

The individuals that were interviewed all represented medium to large companies based upon head count, with 0-35 being small, 35-99 being medium, and 100+ being large. Each company represented a different industry, but were all production based. Two of the three companies originally had production facilities in the United States, and have recently reshored their facilities back to the United States or have remained in the United States. The main reason for keeping production in the United States or moving it back is the embracement of lean, ‡5s, and six sigma

‡ *Lean is the practice of eliminating waste from a manufacturing setting. Wastes include the waste of motion, overproduction, defects, transportation, waiting, inventory, and over processing. Six sigma focuses on quality to near perfection. 5s is a practice of lean that looks to sort, set, shine, standardize, and sustain to help eliminate waste*

practices to teach their employees how to take control of their job and how to keep an open mind for improvements. One candidate stated that not only from a production standpoint are they trying to cut waste, but throughout the entire supply chain. Retailers are now reaching out to suppliers and manufactures on how to cut waste in the supply chain and therefore realize a financial gain in each node in the supply chain.

Through the lean training the companies interviewed are openly embracing continuous improvement to constantly cut waste in the sense of over-processing, unnecessary steps, and inventory management. Total Cost of Ownership models were mentioned in each interview by the interviewee as being the top item that is getting the most attention when discussing the location of their production facility. By embracing continuous improvement and understanding the TCO model, these companies said their employees feel they are more empowered over their job; they are increasing their output therefore lowering the cost of labor per item, and are able to improve overall efficiency.

Along with these practices was the implementation of technology to increase production, increase output, and increase the value of their employees. An interviewee stated that with the embracement of new technology they have increased the value added per worker in the production process, which leads to higher output and subsequently more employment to match an increased demand for their products.

Our interview with professionals in the manufacturing field reveals that government policies to revitalize small and medium sized firms did not seem to exert any impact on businesses. The price of the products or services offered have been at a relative constant due to the lessening of supply and the diminishing amount of resources being used by China during the construction boom for the movement of production facilities to China. All companies are hiring for skilled positions such as welders, die cutters, and internal auditors. All three interviewees reported troubles in hiring. One reports finding individuals with drive is a rare find for positions in a production plant. Manufacturing is viewed as an undesirable career choice. Another candidate believed high schools are not training students enough with proper work ethics or knowledge to go right into a position from high school. All three interviewees

agreed that there has more training for employees on the production floor in the past two to three years than ever before.

According to data collected from the Bureau of Labor Statistics, the results reflected an increase percentage change based on current dollars since the 4th quarter in 2008. The past two quarters in 2013 are at an ideal growth rate of 2.4 and 2.8%. Based on past growth rates, the economy is showing a healthy recovery (United States Department of Labor). This growth is based on the output of goods and services in the United States. According to the Bureau of Economic Analysis, durable goods manufactured were the largest contributor to read GDP by state in 2012 and had significant growth in 2011.

Another measure that determines the impact of reshoring on the economy is the amount of exports. Since 2009, there has been an increase in exports of more than $130 billion. This increase in exports means that the current facilities are increasing their output, utilizing skilled workers to make their processes more productive, and that there are more companies in the U.S. contributing to this increase in exports.

In terms of employment, since January 2009, 64,000 jobs in the durable goods segment were added (U.S. Bureau of Labor Statistics).

Quantitative Results: Regression Analysis.

Table 2: Regression Results.

Variable	Coefficient	t-statistic
Constant	-171.33**	-8.69
Education	351.51**	5.37
Manufacturing Productivity	1238.66*	12.03
Business Cycle**	-3.35**	-4.57
Manufacturing Job Growth Rate*	-112.02*	-13.59
Time	-0.68**	-4.94
Globalization	2.77*	.003

Note: *, **, *** indicate that the coefficient is statistically significant at 1%, 5%, and 10% levels respectively.

Equation 1 is estimated using the ordinary least squared approach. The results are shown in Table 2.

The table reveals that the adjusted R-Squared=.99, this meaning that 99% of the variations in the dependent variable can be explained by the independent variables. All the variables are statistically significant.

The estimated coefficient of the globalization variable is positive and significant at 1% level. This means that a 1% increase in international trade will lead to a 2.77% increase in industrial production. The time trend variable shows a negative coefficient, statistically significant at a 5% level; in other words, industrial production has been declining on average since 2000. The next independent variable is job growth in manufacturing. It reflects that a decrease in employment in the manufacturing sector leads to a decrease in manufacturing production. This results contrast that of Baily and Bosworth, 2014, showing that productivity has not been impacted despite the decline of employment in the manufacturing industry.

Consistent with economic theory, the estimated coefficient on the business cycle variable also shows a statistically negative correlation, with that the industrial production decreases during periods of economic slowdowns. The estimated coefficient on the education variable is positive and statistically significant at 5 % level. In other words, an increase in the level of education is associated with an increase in the manufacturing production, everything else constant.

Conclusion

The results indicate that productivity, level of education, and globalization are positively associated with reshoring

The number of facilities moving back to the United States will continue to increase over time as more companies analyze their total cost of ownership models. The types of jobs that come back will never be what they were during the industrial period; however the jobs offered will provide the training and education to meet that of the growing service sector to give the employees more power over their positions and give the companies increased output because of the lean manufacturing taking place. Reshoring will continue to play an impact on the economy and I suspect that the impact will increase as time goes on and more companies start to participate.

Finally, there are other variables that show a negative association with manufacturing production index. These

variables are business cycles, manufacturing job growth rate, and time. In line with Ray & Medoff, (1985) the reason for decrease in production during a trough is contributed to manufactures hoarding labor and assignments, decreasing the overall utilization of labor and decreasing the output of the plant.

Appendix

The results of the interviews reflect the opinions and knowledge of two chief executive officers along with a supply chain consultant.

The questions asked were as follows:

What size is your company? (small, medium or big)

How would you describe the stability/ financial health of your company?

How is the productivity of your plant?

Have you always been a U.S. based company?

If yes, how have you been influenced to change production methods to match that of offshore competitors?

If no, what influenced you to move?

What education level do you require from your workers?

What type of training is required?

Has that changed in the past few years and how?

Is the total cost of employment rising or falling?

Can you explain the reasons why for that trend?

What type of competition do you face from local/ international businesses?

If your company is struggling, what actions do you plan to take to fix the problem?

If your company is flourishing, what actions did you take to achieve that result?

What government policies do you notice impacting your business?

Do you think they are helping or not helping you?

Are they helping big/small corporations?

Do you have access to resources to help you with those policies?

What are those resources?

How have the prices of your products/services changed?

What caused that change?

What type of jobs do you mostly hire for?

Is the workforce supply higher or lower than expectations

when looking to hire?

Why do you think that is?

Do employees need more training now than, say 5 years ago?

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