THE IMPORTANCE OF MANUFACTURING

May 2011

The Engine of Employment

In 2009 manufacturing directly employed 12.0 million people. The manufacturing sector was the fifth largest employer in the U.S. economy behind only government with 25.0 million workers; health and social services 18.4 million; retail trade 17.3 million and professional scientific and technology services 12.1 million. Direct manufacturing employees made up 7.0% of the 172.4 million US workforce.

Direct manufacturing employment measures only people employed by a company that is categorized as a manufacturer by the North American Industrial Classification System (NAICS). This excludes people who actually work inside a manufacturing plant but receive their paycheck from another business, such as a leased employee firm, janitorial service, security company, etc.

The Employment Multiplier and Job Growth

All economic activity has a "multiplier" effect because direct business activity, such as manufacturing, requires purchases from numerous other industries that in turn buy goods and services from still other businesses. This increased demand down the supply chain is the indirect effect. As a result of the direct and indirect effects the level of household income throughout the economy will increase as a result of increased employment. A proportion of this increased income will be re-spent on final goods and services: this is the induced effect. An industry employment multiplier is a result of a series of economic calculations that estimates the number of indirect and induced jobs resulting from one job in the industry being studied. The larger the multiplier, the greater the economic impact of the jobs in that industry.

Multipliers are location specific. They are closely related to the amount of purchases made by each industry within the region, state or nation and depend on each location's industrial mix. The greater the variety of goods and services available in a location the larger the multiplier. A large diverse economy is more likely to locally recycle indirect and induced dollars.

Manufacturing's employment multiplier was 6.0 in 2009 which means that one manufacturing job is responsible for five additional jobs in other sectors of the economy. The 12 million direct manufacturing workers in turn generate another 60 million jobs in other industries.

Manufacturing is responsible for a total of 72 million jobs, more than 41% of total US employment of 172.4 million.

The chart below shows that the manufacturing industry has the second highest employment multiplier among all major industry sectors, only behind the utility industry, which is an extremely capital intensive industry. In comparison, the retail industry has an employment multiplier of 1.5, which means one retail job can create only 0.5 additional jobs for the economy.

Industry	Employment Multiplier	Indirect & induced jobs for each direct job
Utilities	6.6	5.6
Manufacturing	***6.0***	***5.0***
Mining	4.3	3.3
Information	4.3	3.3
Finance & insurance	3.4	2.4
Management of companies	3.4	2.4
Wholesale Trade	2.9	1.9
Real estate & rental	2.6	1.6
Transportation & Warehousing	2.6	1.6
Professional- scientific & tech	2.5	1.5
Construction	2.4	1.4
Ag, forestry, fish & hunting	2.2	1.2
Health & social services	2.2	1.2
Government	1.9	0.9
Other services	1.8	0.8
Administrative & waste services	1.8	0.8
Educational services	1.8	0.8
Arts- entertainment & recreation	1.7	0.7
Accommodation & food services	1.7	0.7
Retail trade	1.5	0.5

Manufacturing's employment multiplier has been steadily increasing as a result of productivity increases, the increasing use of high technology and growing use of leased labor. As noted above leased labor is captured as indirect employment in the multiplier.

Good Jobs, Good Wages and Benefits

Average compensation, including wages and benefits, for manufacturing workers in 2009 was $69,217, in comparison with the U.S. average of $45,320. It was the fourth highest paying sector, only behind the utility, management, and information industries.

Industry	Average Compensation 2009
Utilities	113,926
Management of companies	110,369
Information	76,237
Manufacturing	***69,217***
Wholesale Trade	68,220
Government & non NAICS	65,448
Finance & insurance	65,199
Mining	60,621
Professional- scientific & tech services	57,141
Health & social services	46,789
U.S. Average	**45,320**
Transportation & Warehousing	43,334
Construction	38,314
Educational services	34,959
Administrative & waste services	28,950
Retail trade	27,411
Other services	24,328
Arts- entertainment & recreation	22,418
Accommodation & food services	21,482
Real estate & rental	13,064
Ag, Forestry, Fish & Hunting	11,963

Source: 2009 U.S. data, developed by Minnesota IMPLAN Group, based on Census data.

Export Powerhouse

Manufacturing exports have increased since 1987 by 125%: from $263 to $693 billion in constant dollars adjusted by the commodity price index excluding fuel. A more detailed discussion of exports will come in the discussion of manufacturing in a globalized world.

The Challenge of Data Variations

All of the data in this report comes directly or indirectly from the government. Various government agencies use different definitions for different terms and use different data collection and/or aggregation methods so, for example, output of an industry from the Census Bureau sometimes is different than output from the Bureau of Economic Analysis.

Deflators. Raw data is collected in nominal dollars. Nominal, or current, dollars refers to the currency value at the time the data originates. It is the actual amount of money spent or earned. Constant, or real, dollars adjust for inflation-deflation. Real dollars are best for comparing data over time. The adjustment is made by use of a deflator. (Some highly technical deflators are referred to as "chained indexes.") The most familiar deflator is the Consumer Price Index (CPI). It's often used by government agencies or the press to adjust for overall inflation. The CPI is based on a basket of the typical things that consumers buy, weighted for how much of each commodity the "typical" or "average" consumer buys. This is fine for measuring overall consumer purchases but its not very good for measuring manufacturing or any other single

component of consumer spending. The prices of housing, health care, vacations and manufactured goods (to take a few of the components in the CPI) do not all change by the same percentage at the same time. To solve this problem the government and private economists have developed literally hundreds of deflators. When comparing, say, the cost of a Big Mac in 2010 to a Big Mac in 1999 the choice of one deflator over another will substantially change the result. Different government sets of real data use different deflators. In this paper we generally will start with current dollar data and apply a selected deflator, which will be identified in a chart or endnote.

Which Data is Best? The answer is it depends. In this paper we try to pick the data which comes closest to reflecting the real world. Economists and researchers will disagree on what definition, collection method and deflator is best for describing a particular economic event. In this paper most of the time – but not always -- we start with nominal dollar data from the Bureau of Economic Analysis Input/Output tables. This is the data that is rolled up into the complete set of national accounts. BEA I/O data is particularly useful is showing the interrelationships among industries. Finally, it is the data on which input/output programs such as IMPLAN rely.

Why do the Starting Dates in Charts and Text Differ? For many years companies were categorized by Standard Industrial Classification (SIC) codes. A few decades ago data began to be collected using the North American Industrial Classification System (NAICS). The government has not yet translated all of the earlier SIC based data into NAICS data. Often only data for selected years beginning in 1987 is available.

Value Added Output

American manufacturers produce more products than ever before, even after deducting imported parts that go into finished goods. The table below shows a continual expansion of shipments and value added, with the exception of recession years such as 2008. 2010 preliminary estimates indicate that manufacturing has resumed its growth in value added.

Shipments, or output, consist of the selling total price received for goods. In economics value added by a manufacturer is the value of output minus the value of purchased inputs. The value added by a steel mill, for example, is the price of finished steel less the cost of purchased iron ore, coke, scrap steel, energy, purchased services, etc. Value added by a manufacturer is roughly equal to labor costs plus return on capital plus taxes paid. Value added is the best way of looking at output because it excludes the cost of purchased inputs such as imports.

Some firms are highly integrated, that is they buy only raw materials and perform most of the processes to make the final product internally. More commonly the firm that sells the final product buys subassemblies (parts) from other specialist suppliers that in turn buy subassemblies from second tier suppliers and so forth down the supply chain. From the perspective of a community concerned about wealth creation it really doesn't matter if a particular plant is integrated or has a long supply chain. What does matter is the total domestic value added of the final product, that is the wages, profits and taxes earned locally.

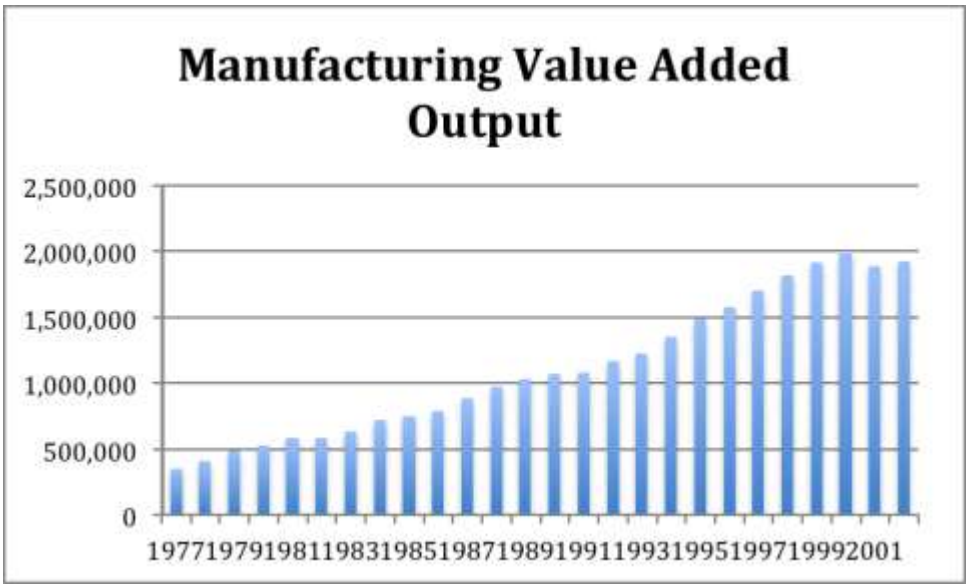
The Bureau of Economic Analysis and the Census Bureau calculate value added differently, a subject we will return to in the next section where we consider some important aspects and controversies surrounding value added.

US Manufacturing Output

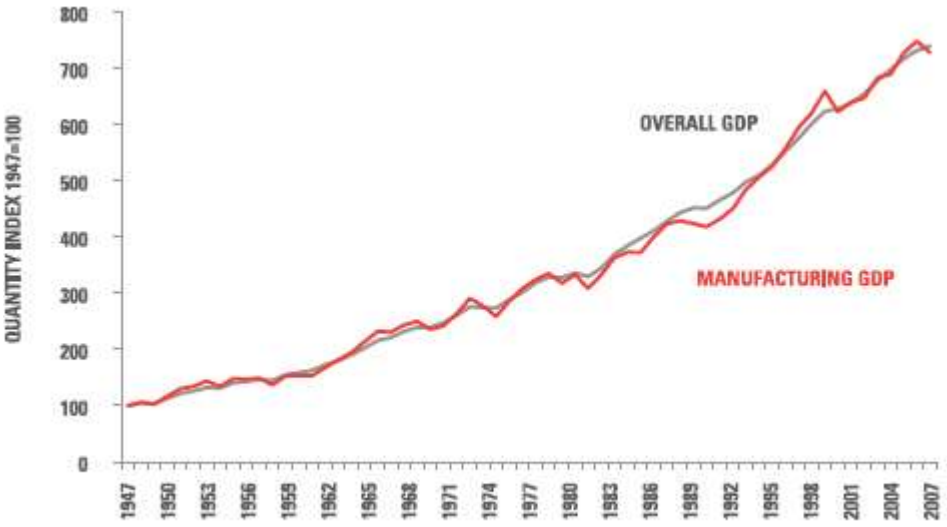
Millions of dollars

	Bureau of Economic Analysis			Bureau of Census		
	Output	Value Added		Output	Value Added	
			2005 dollars			2005 dollars
	Nominal	Nominal	Chained	Nominal	Nominal	Constant
1977	N/A	439,138	N/A	1,358,526	585,166	968,850
1978	N/A	490,481	N/A	1,522,937	657,412	1,045,270
1979	N/A	544,863	N/A	1,727,215	747,481	1,143,724
1980	N/A	558,321	N/A	1,852,668	773,831	1,141,647
1981	N/A	619,646	N/A	2,017,543	837,507	1,190,334
1982	N/A	606,473	N/A	1,960,206	824,118	1,152,113
1983	N/A	657,491	N/A	2,045,853	882,015	1,227,715
1984	N/A	731,763	N/A	2,253,429	983,228	1,341,137
1985	N/A	751,429	N/A	2,280,184	1,000,142	1,331,322
1986	N/A	777,365	N/A	2,260,315	1,035,437	1,364,338
1987	2,376,412	823,105	864,600	2,475,939	1,165,741	1,527,478
1988	2,588,841	900,188	925,126	2,695,432	1,269,313	1,654,065
1989	2,730,291	950,157	935,773	2,840,376	1,325,434	1,696,751
1990	2,788,825	968,904	923,417	2,912,229	1,346,970	1,692,280
1991	2,744,547	976,651	909,226	2,878,165	1,341,386	1,661,303
1992	2,866,977	1,016,703	939,536	3,004,723	1,424,700	1,740,517
1993	2,988,379	1,058,923	977,216	3,127,620	1,483,054	1,790,782
1994	3,205,899	1,127,344	1,041,710	3,348,019	1,605,980	1,900,950
1995	3,447,542	1,180,877	1,084,596	3,594,360	1,711,442	1,964,510
1996	3,558,303	1,208,476	1,119,265	3,715,428	1,749,662	1,938,125
1997	3,772,115	1,277,280	1,186,487	3,834,701	1,825,688	1,957,548
1998	3,839,896	1,326,748	1,245,770	3,899,810	1,891,266	1,966,975
1999	3,975,675	1,368,062	1,312,715	4,031,885	1,954,498	1,988,198
2000	4,140,590	1,415,649	1,396,514	4,208,582	1,973,622	1,963,236
2001	3,893,379	1,343,930	1,332,119	3,967,698	1,850,709	1,814,314
2002	3,848,251	1,355,537	1,365,339	3,914,719	1,889,291	1,851,339
2003	3,954,013	1,374,012	1,404,830	4,015,387	1,923,415	1,903,957
2004	4,241,986	1,482,689	1,517,861	4,308,971	2,041,434	2,039,659
2005	4,657,846	1,568,037	1,568,037	4,735,384	2,204,095	2,204,095
2006	4,921,594	1,651,486	1,636,594	N/A	N/A	N/A
2007	5,239,814	1,698,901	1,690,406	5,338,307	2,390,643	2,357,613
2008	5,340,078	1,647,591	1,608,633	5,486,266	2,274,367	2,213,948
2009	4,522,360	1,584,834	1,469,705	N/A	N/A	N/A
2010	N/A	1,717,525	1,554,402	N/A	N/A	N/A

{Graph is placeholder. Needs revision.}



Manufacturing is often compared to agriculture in terms of a slow decline in its share of employment and national output. However, after adjusting for price changes, the quantity of manufacturing value added (GDP) has generally kept pace with the overall economy during the past 61 years, taking into account both recessions and expansions. Manufacturing GDP does fall faster during recessions (like the recent recession), but it also grows faster in expansions (as it is doing currently).[i]



Between 1947 and 2008, both manufacturing GDP and overall GDP rose over sevenfold. Industry value added can be broken down into its underlying composition of the factors of production and into price and quantity. The figure shows that the quantity of manufacturing GDP keeps up with the change in total economic output. Manufacturing

price changes, however, have not kept pace with general inflation. *Price increases for manufacturing factors of production have grown less rapidly than in the general economy since 1947, and, in fact, the manufacturing price level has actually been falling since 1995* (price cuts are concentrated in computers and electronic products and motor vehicles industries). Consequently, manufacturing creates tremendous value for its customers by allowing them to use a smaller proportion of their budget to buy more and higher quality items.

ESSENTIAL CONCEPTS

Value Added

In economics value added is defined by the Bureau of Economic Analysis as an industry's gross output minus its intermediate inputs (consumption of goods and services purchased from other industries or imported).

> Value added by industry is the contribution of each industry and government to the nation's gross domestic product (GDP). It is also a measure of the incomes earned in production in each industry. Value added is equal to the value of gross output less the value of intermediate inputs and is measured as the sum of the industry distributions of the components of gross domestic income that are attributable to labor and capital in the United States. The components of value added include the returns to labor (as measured by compensation of employees), capital (as measured by gross operating surplus), and government (as measured by taxes on production and imports less subsidies).
>
> Gross output (shipments) is measured by summing the value of an industry's sales or receipts, other operating incomes, commodity taxes, and inventory change.[1]

This rigorous BEA definition is useful because total value added by all industries is equal to Gross Domestic Product. It equals the actual net domestic economic benefit produced by the industry in question.[ii]

> The Census Bureau's measure of value added by industry differs conceptually from BEA's in that it includes the purchased services that are used in production of an industry's product, excludes excise and sales taxes from gross receipts, and does not value inventories on a replacement cost basis, as BEA does.[iii]

The less rigorous Census definition is useful for measuring economic impact of manufacturing because it includes the value of services, most of which are purchased locally. For any given

[1] Gross output is produced using primary and secondary factors of production. Primary factors of production consist of the value-added inputs of labor and capital; secondary factors of production consist of energy, raw materials, semifinished goods, and services that are purchased from domestic industries or from foreign sources. Gross output includes the value of final products (which count towards GDP) and intermediate products (which are used by others in their production processes). Because gross output reflects double-counting—both of intermediate goods and final goods—it is often referred to as "gross duplicated output."

industry and time period Census Value Added will be larger than BEA value added, as the chart above shows. The sum of all industries' Census value added will be greater than the total GDP (33 to 45% higher, depending on year) because Census value added in essence double counts value added by the services purchased by other industries. Census value added data is widely used and cited.

Not everyone agrees that value added output has been increasing. The claim is that somehow imported parts are counted in value added.[iv] This is a real issue in the case of *output.* However, recall that the BEA strict definition of value added is labor compensation, corporate surplus and capital – all domestic items. Our conclusion is that BEA value added is a reasonable way to measure the contribution of manufacturing to the economy.

This conclusion is true for manufacturing as a whole but may not be true for the components of manufacturing. There are 19 major subsectors of manufacturing in the BEA Input/Output tables. Petroleum and coal products accounted for 3.52% of total manufacturing output in 1998 rising to 10.58% of output in 2009, or an increase in share of output in nominal dollars of 200.1%. Only four other subsectors increased their share: other transportation equipment by 16.2%, fabricated metal products 3.6%, miscellaneous manufacturing 19.9%, food and beverage and tobacco products 23.6%, and chemical products 28.2%. The other 14 subsectors all decreased in share of output. Observers such as Robert Atkinson argue that the apparent increase in value added for all manufacturing is essentially and artifact of petroleum price increases.

We turn now from industry wide value added to value added per worker. High value added per worker generally occurs in capital intensive industries such as oil refining or cigarette manufacturing. Capital intensive or labor intensive sectors of manufacturing are equally likely to be occupied by advanced manufacturers. However, *within* a sector the firm with the highest value added per worker may be advantaged.

So in sum the criteria of relatively high economic value added refers to 1, relatively high domestic value added and/or 2, relatively high value added per worker compared to competitor firms.

In marketing value added refers to creation of a competitive advantage by offering product features that confer added benefits to the customer resulting in higher sales. These features can be inherent physical characteristics of the product a (sharper knife that holds its edge, a potato chip with lower transfats) or intangible (faster delivery time, a trusted brand name). The key is that the customer realizes benefits that cause her to pay a higher price, buy more of the product and/or remain loyal to the manufacturer when future purchases occur. Advanced manufacturers have relatively high marketing value added.

Why Primary Jobs Are Necessary

All jobs are not created equal. Some jobs have a greater positive impact on the economy of the location in which they occur. People in these jobs grow, catch, extract, build or fabricate goods.

These ***primary jobs*** are found in agriculture, fishing, mining, construction and manufacturing.[*] Primary jobs create wealth. Wealth as used in this paper refers to the store of all things that have a monetary or exchange value and to anything that has utility and is capable of being appropriated or exchanged. Wealth in this sense is spread throughout society and is not simply things owned by rich people.

Wealth cannot increase if there is a static supply of goods. A thought experiment helps illustrate this point. Imagine an island without any natural resources or manufacturing. Fortunately for the islanders just enough highly nutritious coconuts fall from trees so people get enough to eat, but there are no surplus coconuts. Long ago a ship washed ashore with enough clothes, prefabricated staterooms, furniture, etc for the small population. The islanders can trade goods but they can't create new ones. One islander opened a restaurant. A customer would bring in the coconut he wanted for dinner and the restaurateur would prepare and serve it in a pleasant ambiance. The restaurateur charged either a shirt or a chair for this service. Gradually this service entrepreneur accumulated a lot of shirts and chairs so he became wealthier, that is he had more goods, than most of his customers. His customers had fewer shirts and chairs but the total supply of goods remained constant. Aggregate wealth was unchanged.

And so it is in the real economy. Service providers can increase their own wealth only if their customers are willing to purchase the service with some of their wealth.

Back to the island. One day another ship washes ashore this time with tools, wood and seeds. Some islanders plant the seeds and grow cotton and corn. One fabricates spinning equipment, which he trades to the cotton farmers so they can manufacture cloth. Others make additional furniture. The restaurateur now trades some of his wealth for new products. Soon the total number of shirts and chairs has increased. Aggregate wealth has increased.

The real economy, although more complex, operates just like the island economy. Most places in the world now use money rather than directly trading but money is nothing more than a social arrangement that represents underlying goods. The island was cut off from other communities but in the real world some of the goods produced by primary jobs are surplus to the needs of the immediate community.

> Those goods not consumed by the local market are exported to other markets in exchange for money, or export income. For example, a Tucson company or industry produces more aerospace parts than can be consumed, or bought, by its customers in Tucson. The parts are then "exported" to another market, such as Los Angeles, and money is returned to Tucson for the products. This is what creates the flow of new wealth into the community.
>
> While important in an overall economy, the retail sector does not typically create new wealth in a community. This is because retail outlets located within an area are typically

[*] The term "primary jobs" is used in different ways. Many economic development professionals use the term "primary job" as we do here. "Primary jobs" is used by other people to refer to agriculture, fishing and extraction occupations while "secondary" refers to manufacturing and construction and "tertiary" to service jobs. "Primary jobs" is used by some to refer to jobs that produce goods and services in excess of what can be consumed by the local market.

exchanging money that has already been "created" by primary employers in that area. It is not "new money." Retail is seldom considered a primary employer, in terms of wealth creation, because of the old adage, "retail follows rooftops." In other words, retail must follow customers and those customers are created through primary employment's wealth generating ability.

What are the indirect impacts of new primary job creation? As described in the earlier discussion of multipliers, a result of creating new primary jobs is the demand for goods and services generated by the primary employer. Increased "spin-off" jobs are created. These jobs do not create wealth. They are the products of "wealth" created by primary employment. Generally, they are jobs such as retail services, suppliers, lawyers, doctors, non-profit employment, etc. These occupations provide services to the holders of primary jobs. They may also include jobs that meet the required "input" needs of primary jobs.[v]

Productivity

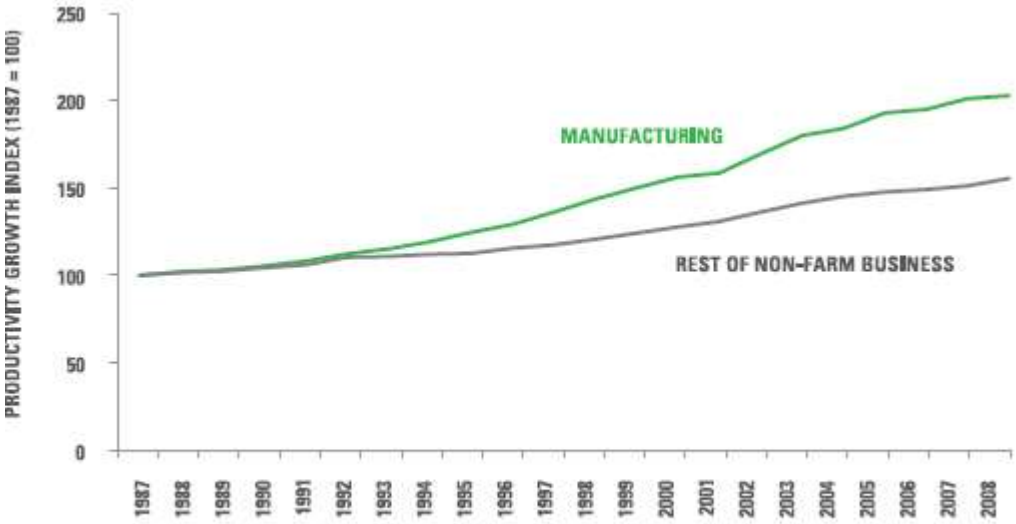
Productivity is output per unit of input. It is possible to calculate productivity for any input, such as "capital productivity." Generally when the word "productivity" appears without a qualifying adjective it refers to labor productivity and that is the usage followed here: Productivity refers to output per unit of labor.

"A country's ability to improve its standard of living over time depends almost entirely on its ability to raise its output per worker… Productivity growth is the single most important factor affecting our economic well-being."[vi]

Increasing productivity is wholly good: if it takes fewer labor hours to build a tractor then it will cost less to make. That cost savings can be applied to increased profit, lower prices for consumers, and higher wages for workers. In fact, all three of these things do happen in the economy. **High productivity, high wages, competitive prices and high profits go together**. The Illinois food industry provides an illustration. Illinois has the highest productivity food production workers among major food processing states, fully 23% higher than the U.S. average. This allows the wages of those production workers to be 11% higher than the US average while labor costs as a percentage of product value is 6% *less* than the US average.[vii]

Increasing productivity is necessary for higher living standards but is not sufficient to guarantee an equitable distribution of its fruits. A characteristic of advanced manufacturers (described later) is that they do tend to share the benefits with workers and customers.

Manufacturing productivity has outpaced productivity growth in the rest of the economy.[viii]



Source: U.S. Bureau of Labor Statistics

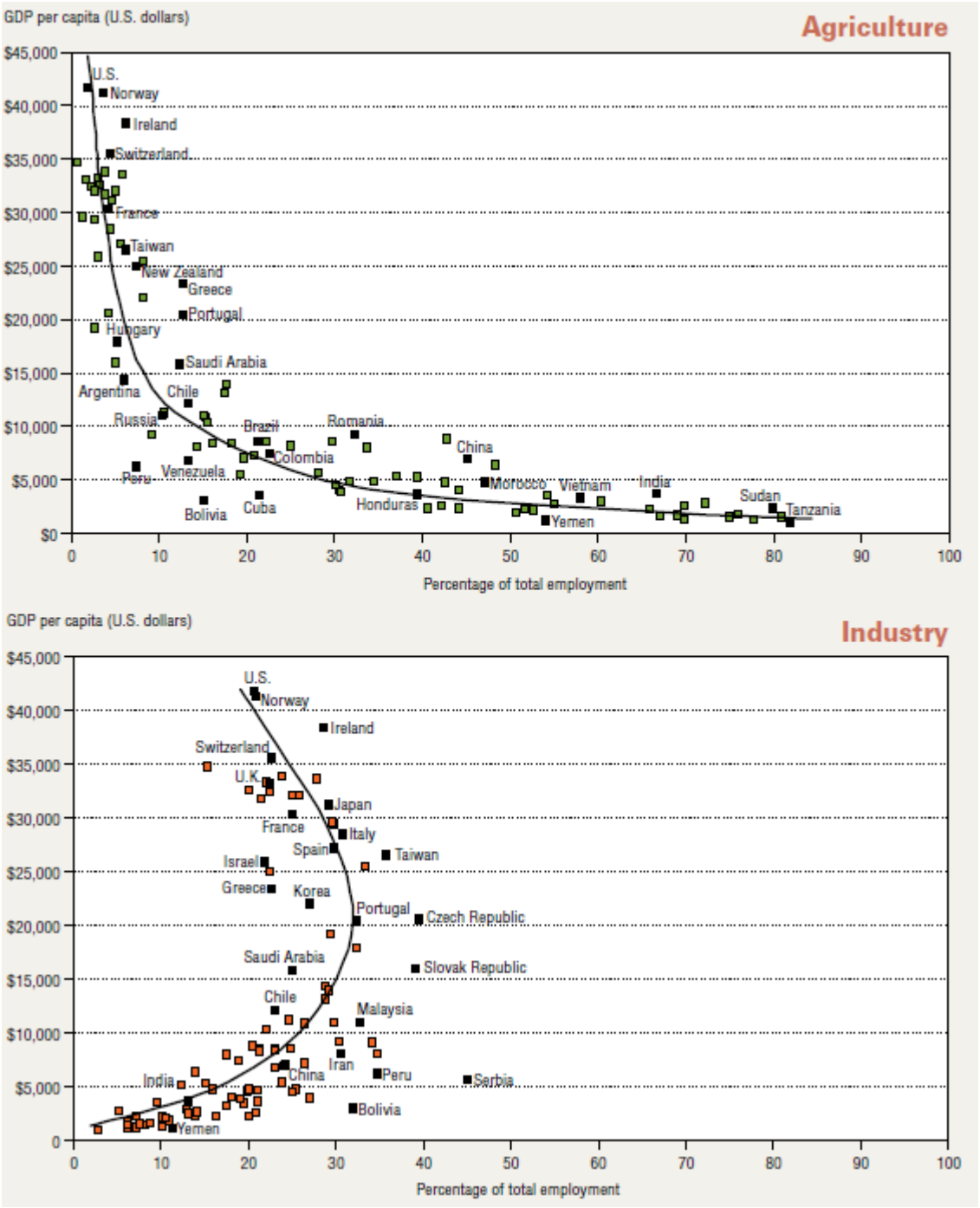
If a worker can produce more per hour does that mean we will need fewer workers? In one sense yes; fewer workers will be needed to do a specific task. A CNC machinist can produce much more than a manual machinist so fewer are needed to produce 1,000 of a specific part. But higher productivity means increased wealth that will increase the multiplier effect. While the number of machinists needed to produce a static number of parts declines the number of indirect and induced jobs increases. Plus, higher productivity results in faster production and lower prices so higher productivity leads to higher demand.

This results in a concept that isn't apparent at first glance.

> Productivity growth in one sector of the economy means it will shrink, rather than grow, as a proportion of the total. Fewer people can produce a given amount of output so its employment share will shrink. If demand for the output rises proportionally less than income (the elasticity of demand is less than 1), then its share of total output will also shrink.[ix]

Note that we are talking about a shrinking *share*. Higher productivity results in fewer inputs required to produce the same output which means surplus inputs will be available for producing other goods. It is precisely because of America's high manufacturing productivity that we can afford vacations, health care, dinners out and other goods we consume in greater per capita amounts than almost any other nation. The huge increase in manufacturing productivity is responsible for the ability to afford the increases in service sector activity, and the consequent increase in service employment.

Statistics comparing countries show that high gross domestic product (GDP) is correlated with a low percentage of agricultural employment. A similar comparison looking at employment in industry and GDP indicates that the share of manufacturing employment increases until GDP per capita is about $20,000 measured in US dollars. As GDP rises from very little to a moderate amount there is a demand for more manufactured goods but manufacturing productivity is not yet particularly high. But at the $20,000 point the curve reverses and increasing GDP is correlated with a decline in manufacturing's share of total employment. This is precisely what we would expect.[x]



The inverse ratio between agricultural employment and GDP is easy to understand: if a population needs to spend a large part of its human resources on feeding itself it will be relatively poor. Once agricultural productivity improves a population can then move to producing goods, as happened in the US. There's a virtuous circle, some of the goods (say combines) end up back on the farm further increasing agricultural productivity. The same thing happens with manufacturing: as manufacturing productivity improves people have plenty of goods but now they start to consume services, driving up service employment.

If the Smith family has enough food and nothing else their wealth is X. If they have enough food and a refrigerator and a car their wealth is X +Y. If the Smiths have enough food, refrigerator and car and take a vacation and Mr. Smith has a stent placed in an artery the family wealth is X + Y + Z. These wealth increases are the result of productivity. It takes fewer labor hours to produce the food and the car and the refrigerator so labor is available to staff hotels and hospitals.

The shape of the manufacturing employment versus GDP curve supports this. At first the greater manufacturing employment and higher GDP are correlated. But above GDP of about $20k the correlation becomes inverse because people have enough goods and begin to want more services.

All of the forgoing assumes we are accurately measuring employment. In fact since employment data is collected by NAICS code, or similar in other countries, many of the people who work in manufacturing plants are counted as being employed in non-manufacturing. For example, leased workers and temps, employees of security firms and janitorial services, etc. Then there are the accountants, bankers, marketing types, etc who support manufacturing and employed by other industries. The ever increasing multiplier captures this. The manufacturing multiplier is now 6.0. If we create one manufacturing job we also create five other jobs, thereby driving down the proportion of people counted as working in manufacturing. (A similar thing happened with agriculture. While the people involved in farming went from 75% to 3% of the US population the people involved in feeding the population did not decline as much. Think about food manufacturing, retailers, restaurants, etc that are in an overall food industry that is much bigger than the agricultural sector per se.)

High labor productivity comes about because of increased financial capital spending, innovative design of products and processes, and increasing skills. Advanced manufacturing depends on knowledgeable high skilled workers to operate and maintain the large investment in sophisticated equipment. In addition the innovative processes that are the hallmark of advanced manufacturing require everyone in the plant to interact in complex ways. Teamwork is essential. The advanced manufacturing worker is well educated and possesses a pallet of both hard technical knowledge and skills and superb soft skills.

Ratios Versus Absolute Numbers

A lot of the analysis in the next section utilizes ratios. For example the changing share of manufacturing exports to total exports reflects a change is a ratio. Ratios have the advantage of overcoming the problem of selecting a deflator, described above. The ratio calculated in nominal dollars or real dollars with any deflator you pick will be the same. Useful as they are ratios don't tell the entire story. If manufacturing exports as a share of total exports declines that could the result of one of two causes, or both: manufacturers are exporting less and/or other industries are exporting more. The first is bad for the economy, the second is good. You only know which is the case if you have absolute numbers along with the ratio.

Endnotes

[i] Data from US Bureau of Economic Analysis. Chart and text from *Facts About Manufacturing*, National Association of Manufacturers, http://www.nam.org/, accessed 1-26-11.

[ii] *Concepts and Methods of the U.S. Input-Output Accounts*, Washington DC: Bureau of Economic Analysis, US Department of Commerce, April 2009.

[iii] Bureau of Economic Analysis website, created January 2006, accessed April 20, 2011, http://www.bea.gov/faq/index.cfm?faq_id=91&searchQuery=&start=40&cat_id=5

[iv] See, for example, S. J. Ezell and R. D. Atkinson, *The Case for a National Manufacturing Strategy*, Washington DC: Information and Technology innovation foundation, April ,2011.

[v] Adapted and edited from a version of this argument found on the web site of Tucson Regional Economic Opportunities on 1-27-11, http://www.treoaz.org/ED101-Primary-Jobs.aspx., originally by Tom Clark of the Metro Denver Development Corp.

[vi] Paul Krugman, *The Age of Diminished Expectations*, Cambridge MA: MIT, 1990.

[vii] Xiochang Jin *et al*, *The State of Illinois Manufacturing*, Chicago: Center for Labor and Community Research, 2003.

[viii] Chart from *Facts About Manufacturing*, National Association of Manufacturers, http://www.nam.org/, accessed 1-26-11.

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