



Manufacturing in the App Economy: How Many Jobs Should We Aim For?

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SUMMARY

We live in a world where the communications sector is driving the recovery and receiving much attention. We believe that this is the most important ongoing development in the American economy, offering the potential for long-term transformation.

But while very important, a boom in communications isn't enough, alone, to achieve balanced and sustainable growth. We need every sector of the economy, including manufacturing, to contribute. With this in mind, the Obama Administration has taken the positive step of proposing a series of policy measures that would encourage domestic manufacturing.

In this spirit, we undertake an audacious question: In this era of apps and social media, what is a reasonable long-term goal for manufacturing

employment? We first show that manufacturing has larger job spillovers than commonly thought, based on new calculations. Next, we estimate the employment consequences of eliminating the trade gap in manufactured non-oil goods, a desirable long-term goal, without reducing our standard of living.

Assuming such a balancing, we find that the U.S. should aim to add roughly 3.5-4 million direct and indirect manufacturing jobs over the long run, raising total manufacturing employment to about 15.5-16 million, or 2001 levels. This bold effort would ease the job drought and offer millions of Americans a path to the middle class. What's more, we would be producing more at home, while borrowing less from the rest of the world.

Achieving this admittedly aspirational goal would come at a relatively small price: we calculate that

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overall economy-wide prices would have a one-time rise of only 1.8-2.0%, spread out over the time it takes to close the trade gap. To put this in context, the inflation rate for gross domestic purchases has averaged well over 2% annually over the past ten years. So closing the trade gap would raise prices by less than one-year's inflation.

INTRODUCTION

The Obama Administration has recently proposed a series of policies for reversing the decline in domestic manufacturing employment and encouraging the growth of innovative U.S. manufacturing industries at home. These proposals include business tax reforms, support for training and education programs to upgrade the skills of manufacturing workers, funding for advanced manufacturing, and an increased willingness to enforce trade treaties.

This initiative is clearly a move in the right direction. We as a country need to pay more attention to innovation and production across every sector of the economy, including manufacturing. Our goal should be to create a balanced economy. That means producing as much as we consume; sustaining our standard of living without taking on loads of debt; and excelling in both tangible industries, such as manufacturing, and intangible industries, such as healthcare and computer programming.

The danger of an unbalanced economy is that an unexpected shock can send us reeling. We saw this in the previous decade. From 2000 to 2007, the U.S. economy did grow and create jobs—but that growth relied on housing and debt-fueled consumption to an unhealthy degree. As a result, when the housing boom crashed in 2007 and cut off consumer and business borrowing in the process, the economy did not have other growth engines to cushion the blow. The lesson is clear: A stool with three legs is going to be far more stable than one which has less.

Today, the economy is gradually picking up speed again, propelled largely by the broad communications sector. The U.S. production of wireless data, mobile apps and ‘organized

information’ is soaring. So is productivity and employment in the broad communications sector. The App Economy has generated about a half million jobs, for instance, and more are coming.¹

A target of 15.5-16 million manufacturing jobs—one-third larger than today's 12 million—gives policymakers something explicit to aim for.

Nevertheless, we need to avoid falling, once again, into the trap of an economy that depends too heavily on one sector. Manufacturing has grown a bit, but the clearest sign of an unbalanced economy is the continued trade gap in non-oil manufactured goods, which hit \$450 billion in 2011. This trade gap, which represents the shift of manufacturing employment and production to other countries, almost certainly has the positive short-term impact of lowering prices. However, the outsourcing of manufacturing production and know-how deprives the U.S. of much needed jobs, and leaves the domestic economy vulnerable to unexpected shocks, particularly because the huge trade gap must be funded by borrowing.

Some of these unexpected shocks could be financial: a new banking crisis that restricts our ability to borrow and fund imports, or a sharp rise in overseas production costs that negate the benefits of offshoring. Alternatively, the shocks could be political: a shift to a more hostile or less market-friendly government in China that, in turn, restricts our access to goods, or perhaps political turmoil at home because a large group of Americans who in the past might have been able to find well-paid manufacturing jobs are now out of work. Any of these individually seems implausible, but then again, so did the housing crisis in 2005 and 2006.

RESULTS OF THIS PAPER

In this paper, we explore the implications, both positive and negative, of rebalancing the economy

by eliminating the non-oil manufactured goods trade gap without reducing our standard of living—that is, while holding real consumption and investment constant. If we could shift from foreign to domestic production, how many more manufacturing jobs would be created? And how much will economy-wide prices rise?

It turns out that to answer these questions, we must go beyond official government data in two ways. First, as we have indicated in a previous paper, the government does not collect statistics on the price difference between imports and comparable domestic products. In fact, official government figures implicitly assume that imports and comparable domestic products are the same price.² In an era of rampant offshoring to achieve lower costs, this assumption has obvious flaws. In this paper, we introduce an explicit price difference between imports and domestic-made products.

We as a country need to pay more attention to innovation and production across every sector of the economy, including manufacturing.

Second, in this report, we show that the positive spillover effects of manufacturing have been substantially underestimated. Specifically, the manufacturing multiplier—the number of manufacturing supply chain jobs generated by an initial manufacturing job—is higher than previously thought.

Ironically, the distortion in the data is worse for manufacturing industries that have been heavily affected by offshoring to low-cost countries. This sets up a vicious political and economic circle. The data makes it look like manufacturing is a less important job generator than it really is. That invariably weakens political support, which in turn increases the incentive to move manufacturing overseas.

FIGURE 1: THE IMPLICATIONS OF BALANCING TRADE IN NON-OIL MANUFACTURED GOODS

Manufacturing employment	Would increase by 3.5-4 million jobs, to a total of 15.5-16 million
Trade Deficit	Would fall by \$450 billion
Unemployment Rate	Would fall by 2.3-2.6 percentage points
Budget Deficit	Would fall by \$220-\$250 billion
Economy-wide price level	Would have a one-time rise of 1.8–2.0%, distributed over the years necessary to close the gap

**Assumes that replacing imported goods with comparable domestic goods would increase their price by 50%. Also assumes that the trade deficit is eliminated without reduced average domestic living standards.*

Calculations: Progressive Policy Institute

Based on our revised estimate of the manufacturing multiplier, we calculate the number of manufacturing jobs required to balance non-oil manufactured goods trade while maintaining the overall standard of living. Accordingly, we find that the U.S. economy should aim for an additional 3.5-4 million manufacturing jobs across a range of industries and skill levels. Given that we have roughly 12 million workers in manufacturing as of March 2012, that gain would bring total manufacturing employment up to approximately 15.5-16 million workers, or 2001 levels.

To put this in perspective, the rise in manufacturing employment above would cause the unemployment rate to drop by 2.3-2.6 percentage points and the federal budget deficit to shrink by about \$220-\$250 billion. The one downside: A slight acceleration in the inflation rate, as the *overall* price level rises by 1.8-2.0% over the course of several years.

We acknowledge that balancing non-oil goods trade is a difficult goal. But that's precisely what makes it worth pursuing. A long-term target of 15.5-16 million manufacturing jobs—one-third larger than today's 12 million—gives policymakers something explicit to aim for.

Our aim is to enlarge America's productive base, not shield it from foreign competition. The Progressive Policy Institute does not favor protectionism, or any form of building walls against foreign goods and services. Trade is essential to gains in standard of living and quality of life. Instead, we are advocating balanced and sustainable economic growth, so we can afford a high standard of living in the long-term without relying so heavily on borrowing and debt. Simply put, we have to shoulder our share of the global production burden.

This paper is the latest in our series of publications that advocate for a shift in policymakers, politicians, and all Americans' way of thinking about the economy. We must begin to think of ourselves first and foremost

A boom in communications isn't enough, alone, to achieve balanced and sustainable growth.

as workers and producers, not consumers. An economy driven by consumption and debt is simply unsustainable. The only way to achieve sustainable growth, and to create the high-skill, high wage jobs of the future, is through targeted innovation and investment that shifts the U.S. back to a production economy.

THE BASICS OF MANUFACTURING

Let's start out with some basic facts about manufacturing. The U.S. imported \$1.6 trillion worth of non-oil manufactured goods in 2011. Because of these imports, items such as clothing and electronics are cheaper than they would otherwise be, offering Americans a higher standard of living as a result.

At the same time, the U.S. ran a \$450 billion non-oil manufactured goods trade deficit in 2011 with the rest of the world. Despite a modest rebound in production, manufacturing jobs are still down

almost 2 million since the recession started, accounting for more than 50% of the decline in non-construction employment.

But after these widely accepted facts, the disagreement begins. Many economists and policymakers, claim that the fall in manufacturing jobs is not worrisome, due to an ultimately beneficial increase in domestic manufacturing productivity. They point to the fact that manufacturing production, according to the Bureau of Economic Analysis, grew by 16% from 2000 to 2010, roughly paralleling the 17% gain in real gross domestic product over the same period.

However, a growing body of research suggests that outsourcing to low-cost countries, such as China, has exaggerated the manufacturing production and productivity figures. In particular, a **decrease in the cost of production** because of offshoring can show up in the official data as an **increase in domestic manufacturing value-added**, even after the usual adjustments for price changes.

So while the official figures show a \$286 billion increase in domestic manufacturing value-added from 2000-2010, in nominal dollars, much of that gain is likely the result of attributing the increase in cheap imports as a gain in domestic production. To understand the magnitude of the problem, remember that manufactured imports from China rose by \$277 billion from 2000-2010, nonoil manufactured imports from Mexico rose by \$65 billion, and low-cost countries such as Vietnam, India, and Thailand showed lesser gains. This topic is treated at length in Houseman et al (2011), Mandel (2012), and Mandel and Carew (2012).³ A recent report from the Information Technology and Innovation Foundation, which was partly built on this research, also argues that domestic manufacturing is going through a historic yet avoidable decline.

In fact, once we correct for measurement problems related to globalization, the U.S. economy is clearly becoming increasingly unbalanced, with manufacturing production growth lagging way behind other sectors. This makes the need for

rebalancing all the more important. Nevertheless, let's be clear here: We are not criticizing the U.S. statistical agencies, widely acclaimed to be among the best of the world. Yet even as the U.S. economy has become more and more globalized, the statistical agencies have faced budget constraints that make it harder to expand programs that track the relationship between the U.S. and the rest of the world. Indeed, in some cases they have been forced to cut back on relevant data collection.

THE RELATIVE PRICE OF IMPORTS AND DOMESTIC-MADE PRODUCTS

The single most salient fact about U.S. manufacturing today is that it costs more to produce many goods in the U.S. than it does overseas. That's why offshoring is compelling to many companies—they are following the market mandate to seek out the lowest prices.

What this means is that moving production back from overseas to the U.S. is likely to cost Americans more in terms of higher prices. How much? The Bureau of Labor Statistics (BLS) publishes statistics on import price inflation and domestic price inflation. Surprisingly, the BLS does **not** collect data on the relative price of imports and domestic-made goods. That is why in 2011, PPI proposed additional funding to allow the BLS to conduct a Competitiveness Audit to determine the relative price of imported and domestic goods in different industries.

In the absence of such a survey, we have to rely on anecdotal evidences and fragmentary statistics. Generally, these data sources suggest that the price of imports from low-cost countries such as China are about one-third lower than the price of comparable domestic-made goods. Or to put it a different way, for domestic goods that are replaced by imports from low-cost countries, the price of the domestic good is about 50% higher than the price of comparable imports.⁴

DIRECT MANUFACTURING JOBS

Let's go a step further and assume that, on average, any non-oil imported manufactured good can be replaced by a comparable domestic-made good

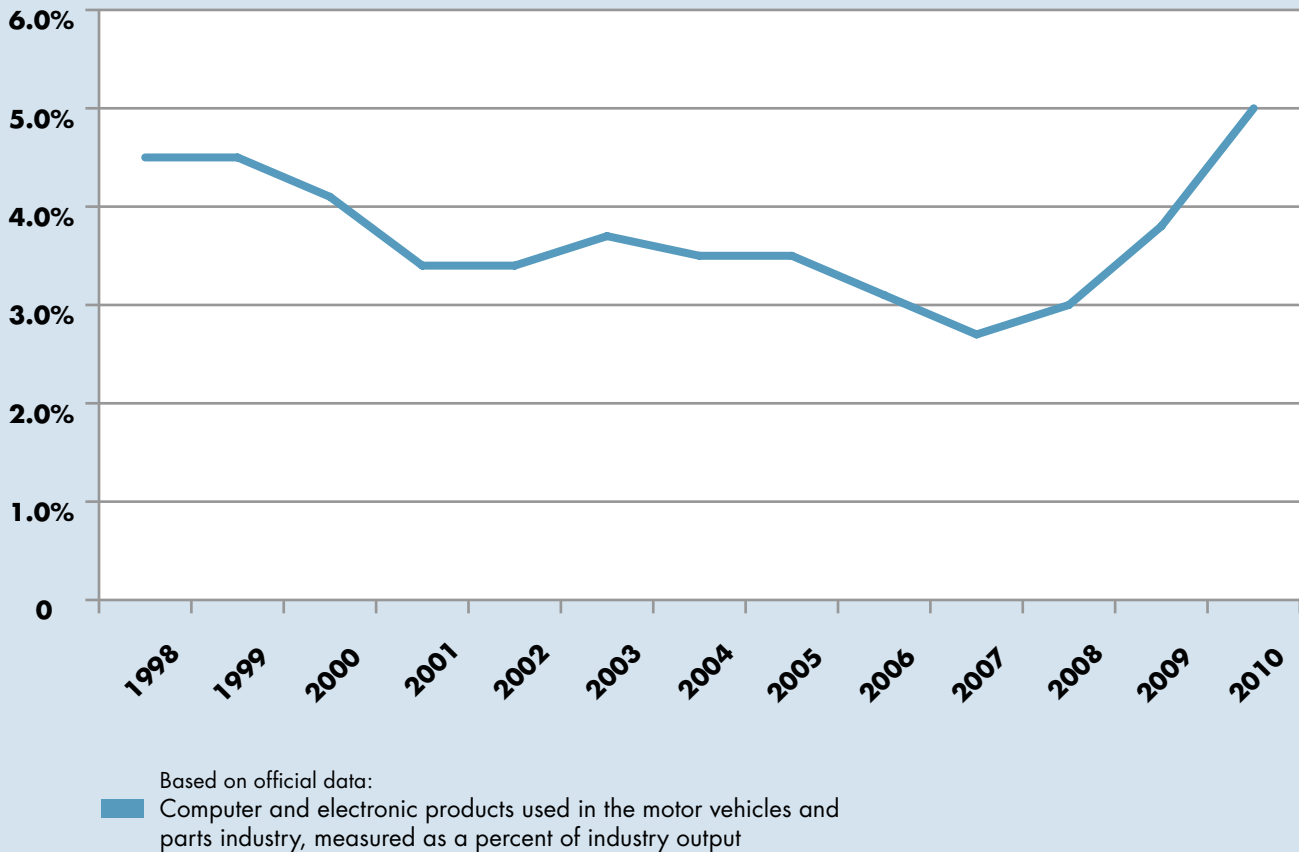
with an average price increase of 50%. This may seem like a high number, but we are implicitly building in such additional costs as training workers (later in the paper we briefly discuss the implications of a smaller average price difference). Our goal or experiment, if you will, is to eliminate the non-oil goods trade deficit without changing what Americans purchase and consume. That is, we don't want reduce economy-wide living standards. So if we decrease the volume of imports by some amount, we want to increase the volume of domestic manufacturing production by the same amount.

The only way to achieve sustainable growth, and to create the high-skill, high wage jobs of the future, is through targeted innovation and investment that shifts the U.S. back to a production economy.

As a result, to eliminate a \$450 billion nonoil goods trade deficit will require domestic manufacturers to produce \$675 billion of additional manufactured goods for sale to the original purchasers of the imports. (\$675 billion = 1.5 x \$450 billion). So if we are closing the non-oil manufacturing trade deficit, we need to figure out how many workers across manufacturing industries we need to produce \$675 billion worth of domestic-made goods. This adjustment for the price difference between imports and domestic production is a key step in estimating the employment effect of eliminating the trade gap. Without this adjustment, we would underestimate the number of jobs created in domestic manufacturing.

We assume that the amount of the deficit, and corresponding number of required workers, are distributed by industry in the same proportion as their share of nonoil goods imports. Distributing

FIGURE 2: THE SUPPOSEDLY SMALL ROLE OF COMPUTER AND ELECTRONIC PRODUCTS IN THE MOTOR VEHICLE AND PARTS INDUSTRY



Data: Bureau of Economic Analysis
 Chart: Progressive Policy Institute

the trade deficit across industries in this way will allow our current standard of living to be maintained, by ensuring the same quantity of goods by industry will be available for the purchasers of the original domestic products.

Using the figures for domestic shipments per worker by industry, we then calculated how many more workers it would take, by industry, to produce the additional allocated amount. All told, we estimate that it would require approximately 2.1 million additional manufacturing jobs, distributed across the various non-oil manufacturing industries, to produce an

additional \$675 billion in goods for sale to the original purchasers of the imports.

In this way we get new manufacturing jobs being created across a wide range of industries and skill levels, producing the same composition of goods that the U.S. was previously importing. Why should we assume that the expansion of manufacturing matches imports? After all, don't we just want the high-wage, high-skill jobs where the U.S. presumably is globally competitive?

To answer this question, it's very important to note here that we don't have data on the price gap between imports and domestic production, on

an industry basis or even the level of the whole economy. That means we cannot assess, *a priori*, whether domestic producers can come close to matching import prices, or whether the gap is so big as to be insurmountable.

What we do know is that a large amount of production has been shifted abroad over the last decade. We don't know if that was due purely to a fundamental difference in the cost of production, or if it was due to something else, like a lack of domestic investment in manufacturing, more generous tax policies elsewhere, or targeted industrial policies and production subsidies that enabled other countries to produce at lower costs. Until we see better data, we will respectfully be agnostic about what imports can be recaptured.

WHY THE MANUFACTURING MULTIPLIER IS CONSISTENTLY UNDERESTIMATED

So far we have just considered the direct jobs that are needed to produce the domestic goods sold to the original purchasers of imports. But building a computer, a machine tool, or an aircraft in the U.S. requires parts and materials from other industries as well—also known as the spillover or multiplier effects. These multiplier effects generate jobs as well (known as 'indirect' jobs).

Such spillover effects are a large reason why policymakers are willing to consider programs to support manufacturing. A recent report from Brookings by Susan Helper, Timothy Krueger and Howard Wial documents a broad array of spillover effects from manufacturing.⁵ In this paper, however, we will focus only on the ability of manufacturing to create indirect jobs in the manufacturing supply chain.

Now, there have been many estimates published for the job multiplier effects of manufacturing, with varying results. But they all have one thing in common: They are based on the input-output tables published by the Bureau of Economic Analysis.⁶ Input-output tables detail the supply-chain relationships between different industries. For example, they tell you how much steel and how much electronics is required to make a car, or

how much plastic goes into an airplane. These are known as 'intermediate inputs'.

Outsourcing to low-cost countries, such as China, has exaggerated the manufacturing production and productivity figures.

The input-output tables are essential for calculating the full job effects of closing the trade gap. If we bring back production of a good from overseas, we have to bring back its supply chain as well, so we need to know the intermediate inputs. All other things being equal, an industry that needs more intermediate inputs will have a bigger multiplier effect.

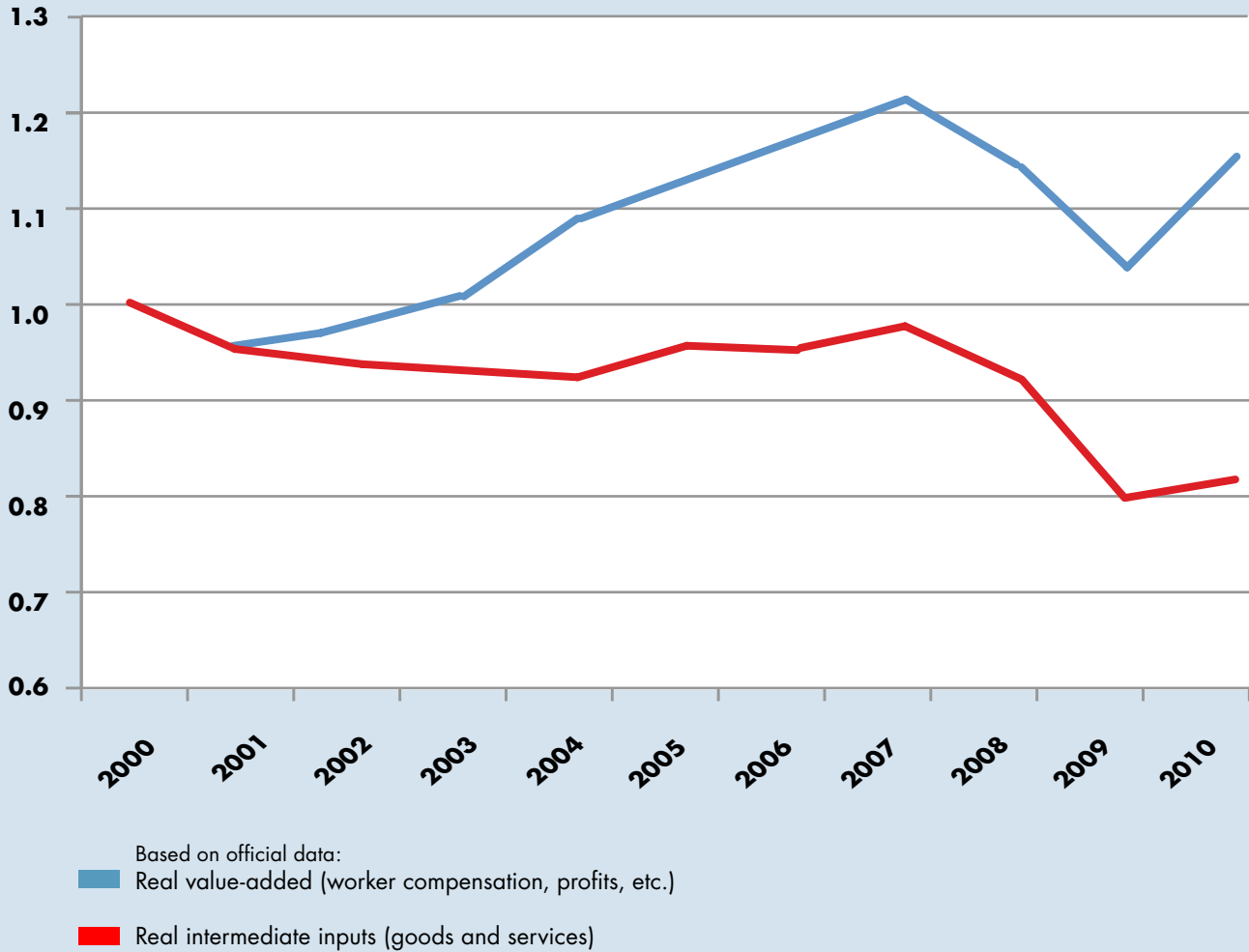
But here's a surprise: The BEA, when it puts together the input-output tables, does not adjust for the fact that many U.S. industries are importing parts and materials from low-cost countries. Once again, budget constraints limit the availability of the necessary data.

This missing adjustment has the effect of making the manufacturing multiplier look smaller than it really is. Let us give an example. Suppose that an industry uses \$900 worth of domestic parts to make a machine that sells for \$3000, so that the parts are 30% of the value. That figure, 30%, helps determine the size of the multiplier (remember, an industry that uses more intermediate inputs will have a greater multiplier and a greater spillover effect).

Now suppose the industry starts buying from a cheaper foreign supplier, so the parts only cost \$600. To the statisticians building the BEA tables, it looks like parts now only account for 20% of the value of the product ($\$600/\3000).⁷ This new value, 20%, is used to calculate the manufacturing multiplier, which now looks a lot smaller.

In the extreme case, if the foreign parts were cheap enough, the links to the supplier industry

FIGURE 3: REPORTED INPUTS INTO MANUFACTURING PLUNGE AS REAL VALUE-ADDED RISES (2000=1)



Data: Bureau of Economic Analysis
 Chart: Progressive Policy Institute

would basically vanish from the official data. If we don't correct for this effect—and no one does—it looks like the spillover effects from manufacturing are smaller than they really are because the BEA does not have the data to properly adjust for the relative price difference between domestic and low-cost foreign inputs.⁸

This problem sets up an unfortunate combined political-economic dynamic. As low-cost imported intermediates enter into a domestic

supply chain, they reduce the apparent backward linkages in manufacturing. In turn, that reduces the manufacturing multiplier, which then reduces the political support for manufacturing. Nevertheless, we'll see later in this paper how it is possible to make a rough adjustment, and recalculate the manufacturing multiplier.

AUTOMOTIVE ELECTRONICS: A CASE STUDY

We see from the previous section that low-cost imports can cause the official government

figures to understate the importance of links between manufacturing industry. But how big a problem can it be? Let's look at the very important example of automotive electronics.

We know that cars have gotten packed with electronics over the past ten years. At a Chicago Fed conference in October 2011, a Ford executive noted that “an estimated 30% to 45% of the vehicle value is electronics.”⁹ The Ford executive Jim Buczkowski also observed that motor vehicles contained “more than 10 million lines of software code and growing,” and “more than 40 Electronic [micro]Controllers, over 60 on some luxury vehicles.” Other experts have similar numbers.

Sounds pretty impressive, doesn't it? Yet the official input-output tables say that computer and electronic products are only 5% of the value of production in the motor vehicle and parts industry. What's more, if we believe the tables, computer and electronic products are supposedly no more important today than they were in 1998.

Figure 2 (p.6) shows computer and electronic products used in the motor vehicles and parts industry as a share of that industry's output. In other words, this chart shows the importance of computer and electronic products in the motor vehicle production process, according to the official input-output table.

The chart tells an odd and implausible story—that computer and electronic products supposedly became less important to motor vehicle manufacturing from 1998 to 2007, and are only now back up to the 1998 levels. This seems unlikely.

What's more, the missing value is not in the software. According to the official tables, the motor vehicle and parts industry purchases less computer programming and systems design services today compared to 1998 (\$283 million in 2010 versus \$348 million in 1998). Something is not right here.

Should we believe the input-output tables, or the experienced auto executive? We're going to



believe the experienced auto executive. Following the discussion above, we suspect that rapid offshoring of automobile electronics has seriously distorted the BEA statistics, and reduced the apparent contribution of electronics to automobile manufacturing. All by itself, this would cause the multiplier from the automobile industry to be significantly underestimated.

MORE EVIDENCE THAT THE MANUFACTURING MULTIPLIER IS UNDERESTIMATED

It's obvious to everyone that the trend over the past 10-15 years has been towards disaggregation and globalization of the production process. Companies have broken out tasks that were once done in-house, and farmed them out either overseas or to other companies in the U.S. As a result, we would expect that the role of intermediate inputs would rise over time.

However, that's not what the official data shows. According to government statisticians, the real amount of intermediate inputs used by manufacturing has plunged by 19% since 2002, while the real value-added in manufacturing

(worker compensation, profits, and other return on capital) has gone up by 16% (see Figure 3).

The apparently falling importance of inputs makes it seem like manufacturing has less spillovers to the rest of the economy. After all, if manufacturers are buying less from suppliers, there are fewer benefits to locating manufacturing facilities in an area.

It's a bit hard to understand these numbers. It's hard to believe that manufacturers are relying less on suppliers than they were in 2000.

Instead, the apparently falling importance of inputs is consistent with the explanation that low-cost imports are distorting the economic statistics. The government statistical agencies do not have the funds to track the price drop from domestic to foreign suppliers. As a result, they interpret the data as saying that manufacturers are using **fewer** inputs, rather than **less costly** inputs. It's worth noting that the service sector, where imports are less important, does **not** show the same drop in real inputs.

THE ROLE OF INTANGIBLES: A COUNTERARGUMENT

In the next section we're going to re-estimate the manufacturing multiplier to show how many jobs might be created by closing the non-oil trade gap and "pulling back" the associated supply chains. Before we do that, however, we must address the key question of intangibles. The value of some imported products includes intangible intellectual property developed in the U.S. For example, a big chunk of the value of an imported laptop computer is directly tied to the operating system—either Windows or Mac OS X— which were mainly designed and maintained in the United States. If we reshore computer manufacturing, we shouldn't count the value of the operating system as a gain for the U.S., because those jobs are already here.

Similarly, despite the fact that iPhones and iPads are all imported, a big portion of their value is actually produced in the U.S., because Apple's intangible contribution to these products through software and design has been so important. For

example, a July 2011 study of the iPad suggested that Apple is responsible for a full 30% of the value of the iPad at the consumer level, while Chinese labor accounts for only 2%.¹⁰ Therefore, reshoring the production of the iPad wouldn't create as many jobs in the U.S. as the total value of the products appears to suggest.

It's hard to believe that manufacturers are relying less on suppliers than they were in 2000.

However, Apple is an atypical example of this phenomenon. Precisely because Apple is widely viewed as the most innovative company in the world, its contribution in terms of intangible intellectual property is also likely to be large. What's more, Apple has been able to use its innovation advantage to drive good deals with its foreign suppliers. It's pretty clear that the U.S. would be better off if more American companies could follow Apple's lead and compete by innovation.

To put it bluntly, Apple is in many ways the best-case scenario. Innovation is hard, and most companies are far less successful. As a result, most goods imports will contain a far lower portion of 'American-made' intangibles than the iPad and iPod.

INDIRECT JOBS FROM CLOSING THE TRADE DEFICIT

So here's the situation: As a long-term goal, we want to close the \$450 billion manufacturing trade deficit by shifting production from overseas to domestic. That generates 2.1 million direct manufacturing jobs at home.

But the supply chains supporting those jobs are still presumably overseas. We need to 'pull back' those supply chains, which will create indirect jobs at home. But how many?

Based on the previous discussion, we know that the input-output tables are distorted by the lower cost of imports, depressing the apparent

manufacturing multiplier. We'd like to adjust the manufacturing multiplier to take account of offshoring, but we'd also like to avoid spurious precision, since the government is not collecting the data on the price and usage of imports that we would need to do an exact adjustment.

So let's get started. According to the input-output tables, manufactured intermediate inputs make up a bit over one-third of the value of manufactured products at the factory level, omitting oil and oil-related products. With a bit of arithmetic, we can use the official input-output data to calculate a manufacturing multiplier of roughly 0.53—each \$100 of manufacturing shipments creates roughly another \$53 of manufacturing output in the entire supply chain.¹¹ Assuming an 'average' relationship between shipments and jobs, then every 100 direct manufacturing jobs creates 53 indirect jobs in the manufacturing supply chain.

When we adjust the input-output tables to account for the lower cost of imports, we find that manufactured intermediate inputs actually make up close to forty percent of the value of manufactured products at the factory level. With a little bit of arithmetic, we see that the manufacturing multiplier rises from 0.53 to 0.64, so that each manufacturing job creates another two-thirds of a manufacturing job in the supply chain. In other words, adjusting for the lower price of imports raises the manufacturing multiplier by approximately 20%.

Interestingly enough, 0.65 is roughly the same manufacturing multiplier as we see from the 1977 input-output table, before outsourcing became significant. It's also roughly the same level as we get from adjusting the 2002 input-output table for low-cost imports.

We can also make the argument that the true manufacturing multiplier should have risen, given all the outsourcing and fragmentation of production. For example, when we calculated a simple model of outsourcing using plausible parameters, we found the share of manufacturing inputs rose from 40% to about 48%. This 48% yielded a manufacturing multiplier of approximately 0.9.

This makes sense. As manufacturing disaggregates and outsources, more and more of the employment is in the supply chain, rather than the manufacturer who sells the final product. As a result, each job at the manufacturer of the final product creates more jobs in the supply chain, not less.

Eliminating the non-oil manufacturing trade deficit would create anywhere between 3.5 million to 4 million additional manufacturing jobs in the U.S.

Based on our model calculations (not shown here), we will treat 0.9 as our upper bound on the manufacturing multiplier. At this level, it would explain why the closing of a large manufacturing plant can have such broad effects on a local economy.

Three points here: First, because we are concerned with the non-oil trade deficit, these figures omit the petroleum refining industry and related products, such as gasoline.

Second, when we calculate the manufacturing multiplier in this section, we are focusing only on manufactured inputs used directly by the manufacturing sector, and ignoring more complicated situations where a manufacturer purchases a service, such as finance, which in turn uses a manufactured input, such as paper, to print financial documents. (This is a crude way of compensating for intangibles in the foreign supply chain).

Finally, we also approached this calculation using a different methodology based on the BLS' employment requirements table. We found the results were somewhat smaller, as expected, though generally consistent with the results given

here. And, of course, as we have repeatedly noted, the lack of relevant data makes our estimates much less precise than we would like.

HOW MANY JOBS?

Based on our calculations, eliminating the non-oil manufacturing trade deficit would create anywhere between 3.5 million to 4 million manufacturing jobs in the U.S. That's the combination of 2.1 million direct jobs, and between 1.4 and 1.9 million indirect manufacturing jobs.

Given the current manufacturing employment of just under 12 million, eliminating the manufacturing trade deficit would bring us to 15.5 to 16 million jobs. This is a level last reached in 2001. In other words, we'd be undoing the manufacturing employment crash of the 2000s.

Now let's look at the benefits to the larger economy. Currently the U.S. is suffering from a severe job drought. The official unemployment rate stands at 8.2%, with about 13 million Americans out of work and actively seeking employment. That's still 5 million more than when the recession began in the last quarter of 2007. What's more, the pace of job creation is not paring down the ranks of the unemployed very fast.

Suppose that all of the new manufacturing jobs were filled by unemployed workers, whether hired directly or through eventual employment reallocation. In fact, 3.5-4 million additional workers would reduce unemployment by about 2.3-2.6 percentage points.

Moreover, instead of receiving unemployment benefits, or borrowing to maintain a standard of living, these workers would now be earning a wage or salary. So, for simplicity sake, if these newly employed workers were all employed in manufacturing, and given manufacturing employees earned an average \$60,000 per year in 2011, we could anticipate a boost in earnings by about \$210-240 billion.

The additional earnings, coupled with fewer outlays by the government, also translates into a badly needed cut in the federal budget deficit. Using

a relationship between unemployment and the federal deficit established by the Congressional Budget Office, we estimate that eliminating the non-oil goods trade deficit would reduce the federal deficit by about \$220-250 billion.¹² This is because the government would collect more in tax revenues – from income, social security, and medicare – while footing the bill for fewer unemployed workers. Certainly a reduction of the federal deficit by about one-fifth would be an important benefit of eliminating the non-oil goods trade deficit.

We estimate that eliminating the non-oil goods trade deficit would reduce the federal deficit by about \$220-250 billion.

Please note that our calculations have intentionally omitted the usual service sector spillover effect, where increased domestic manufacturing output creates more jobs in the service sector as well as manufacturing. The reason: We have even less data about the impact of globalization on services than we do about manufacturing. In particular, we cannot tell how much domestic purchases of 'tradable intangibles' such as financial services, communications, and computer programming would rise if the manufacturing trade gap was closed. We presume that some service jobs would be created at home, suggesting that our employment and budget estimates are understated. However, at this time we cannot say by how much.

THE COST OF BALANCING TRADE

Of course there is an obvious cost to balancing the trade deficit, to taking away low-cost imports: we will experience an increase in everyday prices. This can't be wished away—we know that imports in many cases are less expensive, whether it's because of cheaper wages, lower-cost land, fewer regulations, lower taxes, legal or illegal government subsidies, currency manipulation, or any one of a million different reasons.

Unlike most other discussions of trade, in this paper we explicitly specify that shifting from imports to domestic production requires a 50% increase in price (including the cost of training workers). Given our current high level of unemployment, we don't have to worry that the additional workers will restrict production in other parts of the economy.

Based on this assumption, we see that the \$225 billion difference between the non-oil manufactured goods trade deficit (\$450 billion) and our import price-adjusted estimate (\$675 billion) is the extra cost for these currently imported goods to be "Made in USA." We will assume that this entire cost is passed on to the ultimate purchaser—consumers, governments, and businesses.

However, we can't stop there. The current cost of production in the U.S. already includes some imported manufactured parts and materials, as we saw earlier. When we pull back the supply chain, we want to account for the extra cost of shifting from imported intermediate inputs to domestic inputs. We estimate that this will add an extra \$65-\$90 billion in higher costs on top of the \$225 billion.

In 2011 total gross domestic purchases were equal to \$15.7 trillion. Since the added cost to domestic purchasers would be \$290-315 billion per year, this would cause a one-time 1.8-2.0% increase in prices at the gross domestic purchases level.

In all likelihood, such a large-scale shift from imports back to U.S. production would take years, lessening the sticker shock even more. For example, if it took 10 years to eliminate the trade deficit in this way, the economy-wide inflation rate would increase by about two tenths of a percentage point above what it would have been otherwise.

How did a 50% price differential between domestic and imported goods turn into a rather small 1.8-2.0% difference in prices paid at the economy-wide level? For one, the price paid by consumers in stores typically includes a surprisingly large margin for the cost of wholesaling, retailing, and transportation. Take women's and girl's clothing,

for example, which is all virtually made overseas. According to figures from the Bureau of Economic Analysis, only about 25% of the cost of women's and girl's clothing is the cost of the clothing itself. The rest is the cost of wholesaling, retailing, and transportation.

If it took 10 years to eliminate the trade deficit in this way, the overall inflation rate would increase by about two tenths of a percentage point above what it would have been otherwise.

In addition, as has been pointed out repeatedly, most of what Americans consume these days are services rather than goods. And even within the goods category, the dollar value of imports is relatively small. So shifting from imports to domestic production has a relatively small effect on the overall price level.

A NOTE ON THE PRICE DIFFERENCE BETWEEN IMPORTS AND DOMESTIC PRODUCTION

We have assumed that when we boost domestic production, the domestic non-oil manufactured products are on average 50% more expensive than the imported goods products they replace. We remain very open to the possibility that the average price difference is higher or lower than this assumption. The Bureau of Labor Statistics currently collects data on import prices and on domestic producer prices by industry, but does not publish comparisons. Additional funding for the BLS is necessary to enable the agency to 'match up' imports with equivalent domestic-made products, which would be a very important step forward in understanding the impact of globalization.

But in the absence of such data, let's ask the obvious question: What would happen if the

average price difference was smaller—say 25%? A smaller price difference would reduce the cost to the U.S. economy of balancing the trade deficit, especially in the current high unemployment environment. In this case a 25% price difference would mean that economy-wide prices would only rise by less than 1%.

The jobs created would fall, but not by half. A 25% price difference between imports and domestic production would mean that closing the trade deficit would lead to 2.8-3.2 million direct and indirect manufacturing jobs, rather than 3.5-4 million. In the end, a smaller price differential would make the case for closing the trade deficit stronger.

CONCLUSION

This paper estimates for the first time a plausible ‘target level’ for manufacturing employment, based on the long-term goal of eliminating the nonoil goods trade deficit. We estimate that an additional 3.5-4 million manufacturing jobs would be needed, bringing total manufacturing employment up to about 15.5-16 million jobs. That’s the highest level seen since 2001.

In the process of doing this estimate, we showed that the manufacturing multiplier—the number of indirect manufacturing jobs generated by one additional manufacturing job—is higher than conventionally believed. This is extremely important for understanding the current job weakness of the U.S. economy. The offshoring of production, and the large trade deficits, may have affected employment more than most economists thought.

This also helps us situate manufacturing in today’s tech-driven economy. For the foreseeable future—or at least the next few years—economic growth is going to be led by the broad communications sector. It’s unlikely that manufacturing will ever be as central to the economy as it was before.

However, the higher manufacturing multiplier suggests that manufacturing has an important role in running a balanced and sustainable economy, by moving us toward a production economy that creates jobs, that is more stable, and does not rely so heavily on borrowing as our current economy. Of all the benefits, that may be the greatest of all.

ENDNOTES

1. Michael Mandel, “Where the Jobs Are: The App Economy,” Technet, February 2012: <http://www.technet.org/wp-content/uploads/2012/02/TechNet-App-Economy-Jobs-Study.pdf>.
2. Michael Mandel and Diana G. Carew, “How a Competitiveness Audit Can Help Create Jobs,” Progressive Policy Institute, November 2011: <http://progressivepolicy.org/policy-brief-how-a-competitiveness-audit-can-help-create-jobs>.
3. Michael Mandel and Diana G. Carew, “Measuring the Real Impact of Imports on Jobs,” Progressive Policy Institute, March 2012: <http://progressivepolicy.org/measuring-the-real-impact-of-imports-on-jobs>.
4. For example, Harry Moser of the Reshoring Initiative reports that U.S. prices exceeded Chinese prices by an average of 42% in seven case studies. Moser also stresses the importance of “total cost of ownership” which measures all the factors affecting the offshoring decision, not just the price.
5. Susan Helper, Timothy Krueger, and Howard Wial, “Why Does Manufacturing Matter? Which Manufacturing Matters?” Brookings, February 2012: http://www.brookings.edu/papers/2012/0222-manufacturing_helper_krueger_wial.aspx.
6. Equivalently, calculations of manufacturing multipliers are based on the employment requirements tables published by the Bureau of Labor Statistics, which are in turn based in the input-output tables published by BEA.
7. If the cost drop is passed through to the ultimate purchaser in lower prices, the share of parts now drops to 22% (600/2700) rather than 20%.
8. See Michael Mandel and Diana G. Carew, “Measuring the Real Impact of Imports on Jobs,” Progressive Policy Institute, March 2012: <http://progressivepolicy.org/measuring-the-real-impact-of-imports-on-jobs>. There’s another more sophisticated problem as well. When government statisticians calculate the input-output tables, they start with a benchmark year, which is currently 2002, and then they update their tables from there. It appears that the rising share of low-cost imports further distorts the input-output tables when the updating is done. This will be discussed further in an upcoming technical note.
9. “The Evolving Driver–Car Interface,” James A. Buczkowski, Ford Motor Company: http://www.chicagofed.org/digital_assets/others/events/2011/automotive_outlook_symposium/buczkowski_060211.pdf.
10. Kenneth L. Kraemer, Greg Linden, and Jason Dedrick, “Capturing Value in Global Networks: Apple’s iPad and iPhone,” July 2011: http://pcic.merage.uci.edu/papers/2011/Value_iPad_iPhone.pdf.
11. We also omit the indirect links through the service sector, as noted in the text.
12. The Congressional Budget Office estimates that for every 1% improvement in the unemployment rate, the Federal deficit would be reduced by \$95 billion (<http://www.cbo.gov/publication/41586>).

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