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Closing Remarks:

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P R O C E E D I N G S

MR. KATZ: So, good morning, everyone. Good morning, folks. If you're here to talk about the succession in the Chinese government, that's in the Falk Auditorium.

My name is Bruce Katz. I'm a vice-president at the Brookings Institution. I'm co-director of the Metropolitan Policy Program. And welcome today for a forum to celebrate and review an important new report by the McKinsey Global Institute on manufacturing for the future.

So, for the past several years, the United States has been engaged in what we regard as a long overdue debate about the future of manufacturing in our country and the tantalizing prospect of re-shoring and manufacturing job growth after decades of decline, and there are several reasons for this, obviously, the severity of the recession, the sluggishness of the recovery, global dynamics like rising wages in China, supply chain uncertainty in Asia, and the shale gas revolution at home.

So, we've seen this debate waged in op-eds and blogs and editorials, but I think most importantly it's been informed by the views of CEOs of major manufacturing companies, all of whom have served on presidential councils, like Jeff Immelt of GE or Andrew Liveris of Dow Chemical or Jay McNerney of Boeing, but we've also seen local and state elected leaders. Michigan's governor, Rick Snyder, Colorado's governor John Hickenlooper, Louisville mayor, Greg Fischer, Newark's mayor Cory Booker, they're beginning to see the need to focus in their own policies at the state and local level about recharging U.S. manufacturing.

Three things I just want to highlight at the beginning, there's a lot at stake in what we're about to talk about, particularly with regard to more jobs and better jobs for our economy. First, you'll hear from the McKinsey folks, manufacturing continues to play a special role in our economy and all economies because it delivers quality jobs, it fuels innovations, it drives exports, it reduces the trade deficit, and it really enables the United States to be at the vanguard of a clean tech revolution.

A country that produces more, innovates more, a country that produces less, frankly, should worry about its long-term prospects.

Second, it's essential, post-recession, that the U.S. develop and implement a national manufacturing strategy, and I use the word national rather than federal deliberately, because all levels of government play critical roles in supporting, buttressing, and leveraging manufacturing.

The federal role is obvious given the impact of trade, tax, and currency levels on manufacturing, given the range of federal government investments, but the states have broad powers over such market-shaping policy areas as infrastructure, innovation, energy, education, skills training, and cities and metropolitan areas are critical because they house the institutions that actually do the work, the manufacturing firms large and small, the trade associations, our air, rail, and seaports, advanced research institutions, community colleges, high schools, the list goes on and on.

A manufacturing strategy is really a federalist act and we need to think of it as such.

And finally, we hold this forum, obviously, during one of the most high stakes fiscal debates in our country's history. Our view at Brookings Metro is the federal government does need to scale back the budget for obvious reasons, but that we should use this opportunity to cut consumption oriented subsidies and spending to invest in the things that matter, innovation, human capital, and infrastructure. In other words, invest in activities that support advance manufacturing and industry; cut to invest.

So, with that, let's turn to the agenda today. We'll hear first from our friends at McKinsey, who I'll introduce in a sec, then from a panel moderated by Greg Ip of *The Economist*, with my colleague Martin Baily, with Gardner Carrick, and then closing remarks by Jim Griffith, who's the president of Timken Company.

So, let me introduce what is a tag team from McKinsey. This will be seamless at the Brookings Institution.

Dr. James Manyika is a director of the McKinsey Global Institute.

Frankly, his work is essential reading to all of us -- all of us, and many of whom are in this room, who are interested in growth, productivity, competitiveness, labor markets, technology, advanced manufacturing, advance industry. In 2011, he served on the Department of Commerce Innovation Advisory Board. And most importantly, he's a non-resident senior fellow at Brookings.

And Katy George is a director in McKinsey's New Jersey office -- I hope you were not affected by Sandy -- and a co-leader of McKinsey's global manufacturing practice, and given her New Jersey location, it is not surprising that she is a recognized expert on healthcare and manufacturing working with a range of pharmaceutical and medical device companies.

So, James, the floor is yours.

MR. MANYIKA: Thank you, Bruce. Very much appreciate it. Delighted to be here. Let's get the presentation up.

We thought we would start by trying to inject some optimism into the conversation today because, let me read this, "We're suffering just now from a bad attack of economic pessimism. It is common to hear people say that the era of enormous economic progress which characterized the last century is over and that rapid improvement in the standard of life is going to slow down, that a decline in prosperity is more likely than an improvement in the decades that lie ahead of us."

What's interesting about this is this was actually said in 1930 by Keynes and what, perhaps, is even more interesting about this is that he went on to make a prediction, the prediction was that the standard of living in the advanced economies, he called them the progressive economies at the time, that in 100 years, these economies -- the standard of living would grow by four to eight times to what it was at that time, and if you follow the prediction, this is basically what he predicted, and what's extraordinary about this is, if you actually look at what has actually happened, he wasn't too far off.

So, we mention this only as a way to remind us that it is important not to be pessimistic, that we do have a lot to look forward to, and the future should be bright

and should be exciting.

In fact, one of the things that's quite remarkable, again on this note of optimism, is that if you look at what's happened in the last 200 or 300 years, it is actually quite extraordinary. It took the United Kingdom about 150 years to double its GDP per capita. It took the United States about 53 years, and what's extraordinary is that both the United States and the United Kingdom were working off a base of about -- a population base of about 10 million.

Look at what's happened to China and India. In about 12 years they've doubled their GDP per capita on a much, much, much, much larger base population, so there's a lot to be excited about, lots of opportunities.

Now, let's turn to the topic that we're here to discuss today, which is the future of manufacturing and manufacturing in the future. We think it's important to recognize that manufacturing matters a great deal and continues to matter a great deal.

I think all too often in our conversation we tend to think of manufacturing purely in employment terms. That's an important aspect of it, but there are other significant contributions that manufacturing makes.

First, you look at the contributions to value-added growth. In advanced economies, which is what the global sample is, manufacturing makes up about 16 percent of value-added growth as a share of the advanced economies growth. In the United States that's 12 percent.

You look at employment today and in the average sample here of advanced economies, it's about 14 percent, in the United States about 9 or 10 percent at this point in time. Look at the contributions to exports, look at the contributions to R&D. The R&D contribution is quite striking. If you look at all the private sector investment in R&D, which we tend to associate with innovation, fully three-quarters of that comes from this sector, from manufacturing. You look at contributions to productivity growth, value added growth. Clearly, the glaring point there is what's happened with employment growth, and we'll come back to that in a second. As you can see, that's been largely in

decline, but we'll come back to that point.

There are also other indirect contributions. One of the ones that I think we've all experienced and benefitted from as consumers is the huge amount of consumer surplus that we've all benefitted from the products and services of this industry. Think about what -- adjusted for quality, what we now get in the form of cars, smart phones, and all the different products that we all enjoy. That's a massive amount of consumer surplus that we've all benefitted from.

Let's talk about employment, because I did point that out.

If we look at what's happened in employment amongst all the economies in the world, first of all, if you look at that orange line, the world, the share of employment in manufacturing has largely been declining. We show it here going back to 1981, but it's a much longer, circular decline that we've seen for a very, very long time, and you've seen that play out across virtually all the economies with the only exception of the low income countries, and that has a lot to do with their stage of development and industrialization.

And, in fact, probably one of the more interesting things that came out of the work we've been doing is to observe the fact that as economies become more prosperous, the share of employment in those economies actually declines. So, what you see on this chart, on the horizontal axis, is GDP per capita as it increases over time, and then on the vertical axis you see manufacturing as a share of employment, and what you see is there's a point roughly around -- if you look at this graph -- $10,000 in GDP per capita where manufacturing is generally at its peak, and that's associated with a stage of industrialization in economies.

As you go further to the right, that starts to decline as other parts of the economy pick up, typically the service sector of advanced economies.

So, there is something here about how the role that manufacturing plays in employment changes over time.

One of the key things that we want to highlight in this work that we've

done, and I truly hope that some of you will have a chance to actually read the report in detail, is to identify what we think is an interesting way to think about manufacturing as a set of industries.

I think all too often we tend to think of it just in this subsector, so textiles, electronics, automotive, and so forth. That's certainly very useful, but what we've found to be even more useful is to think of these following groups where we take into account the global dynamics of competition, demand, the factor inputs that go into the different manufacturing activities. We think this actually sheds a lot of light into what happens as nations compete, what happens to employment, and what happens to where nations and companies might have comparative advantage.

So, the five groups that we recognize, one is what we've called global innovation for local markets. So, think of this as industries like chemicals, automotive. We have regional processing, think of this as largely food industries, for example. We have energy and resource intensive commodities, think of these most as mining and so forth. And then we've got global technologies and innovators, and this is typically what we all have the conversation about when we talk about electronics and smart phones and what's happened to that. And then we've got the very, very labor-intensive trade-ables.

What's interesting about this is if you look at it on a global scale, you start to see patterns that start to inform how to think about competition or start to inform how to think about where jobs might be, that starts to shed light on how to think about where on-shoring and off-shoring might actually take place.

I'll illustrate this with a couple of examples. If you look at the first group as a global innovation for local markets, that's a very R&D intensive set of industries and activities, in fact, so the R&D intensity and even the skills that go with that tend to be very high, so that tends to dominate where those activities take place and how companies and countries can compete in those activities.

Contrast that, for example, at the bottom of the page with the labor-intensive trade-ables. You see there that the two things that dominate that group are the

labor intensity as well as the trade intensity. So, that's an example of where, for example, cheap labor makes a big difference, especially in a world in which those industries are highly, highly trade-able.

Look in the middle, the energy- and resource-intensive commodities, you will see that for that group the most dominant input is actually the energy-intensity of that. So, imagine what might happen in the case of the United States if we do have the -- hopefully, the energy revolution we hope we're about to have. That will start to impact quite a bit where and how those activities take place.

So, we find that this map might be a useful tool for both companies, but also for policymakers to think about how to compete in these various industries and where jobs and activities might actually end up.

It's interesting when you take these categories into account to see where, for example, the trade surpluses sit, and this is for the advanced economies. As you can see, advanced economies have a huge surplus when it comes to global innovation for local markets, at the other end of the spectrum, quite a significant deficit, for example, in the labor-intensive trade-ables.

What does it look like for the United States? If you take these five segments of the United States, the second column tells you the share of employment in each of these, and you'll see that the two biggest segments in terms from an employment standpoint, as well as from a value-added standpoint, are the bottom two: global innovation for local markets as well as the regional processing, and those tend to dominate. And you might imagine, again, if we do have an energy revolution, that might actually start to change the -- what happens with the energy- and resource-intensive commodities.

Continuing to look at the United States is what's happened to employment. No surprise, the labor-intensive trade-ables has fallen the most compared to where it might have been even just in the late '90s, and what's continued to be relatively sustained and might even be picking up are regional processing as well as

global innovation for local markets.

So, we find that this is an interesting way to think about, again, how companies and industries compete.

What I'd like to do now is to hand it over to my colleague, Katy, who's going to talk about some of the more exciting trends going forward.

MS. GEORGE: Great. Thanks. It's great to be here. I'm actually -- this is -- being back at Brookings Institute, so what Bruce doesn't know is I actually spent a very important summer here as a research fellow working with a couple of economists when I was in college, which set me on the path to being a labor economist and by a circuitous route has now led me here today.

As James talked about, I think one of the most important findings from the work we did was the fact that you can't look at manufacturing as one ubiquitous sector, but you have to understand the dynamics of the different segments.

The other important finding is that there are a set of trends that will change and reinvent the manufacturing sector going forward in all of those segments and will frankly have far more importance on the shape of the manufacturing sector and individual companies' and countries' competitiveness than wage differentials going forward.

So, let me talk some about some of the most important trends that are reshaping manufacturing.

The first set of trends are all around dramatic changes in demand profiles, so globalization of demand and also fragmentation of demand. We've all seen this type of trend before, we know that consumption is shifting such that emerging markets will be a much greater share of total consumption than ever before, but few really understand the magnitude of this. So, what this shows is that half of global consumption will be in emerging markets by 2025.

This has important implications in manufacturing in two ways, first of all, as James said, many of the different segments that we looked at are actually driven by

where demand is located, right, so if you're in a transportation-heavy segment where transportation cost drives where you actually manufacture, then growth in China means that you have to manufacture close to China or in China.

Regional processing industries are located at the site of demand, so as the profile of demand shifts, the location of manufacturing in those segments have to shift, and so that's quite important, and most multinational companies are not prepared for that.

But the second is that, of course, the nature of demand, the nature of the goods required, changes as emerging markets become far more important markets, and that affects not only the segments where manufacturing locates near demand, it affects all of the segments, regardless of where manufacturing may be located.

So, for example, we found in our research that companies that were trying to compete in emerging markets needed to rethink their packaging dramatically or rethink the features of a mobile phone, completely differently what consumers required in an emerging market versus in the developed markets.

One company I work with makes contact lenses and the demand that consumers have for the beauty characteristics of a contact lens, right, the limbal rings around the eye, are completely different in Asia than they are in America or Europe, and so companies have to rethink the way that they understand those consumer insights and blend them into their manufacturing processes. It requires far more intelligence about consumers and also far more integration cross functionally.

A second major trend that affects not only emerging markets but developed markets also is the fragmentation of demand. So, this is an example from the automotive industry where you see the number of different products, so different product derivatives, different models, has increased dramatically over time and the lifecycle of the products has decreased.

So, we all know this story is true in consumer electronics and we all know that we get our new mobile phones on a very regular basis much faster than the old

telephones, but that's true in all industries.

In the industry I do most of my work in, for example, in pharmaceuticals, the same would be true. Even in a very standard, oral solid dosage plant that makes tablets, you know, basic tablets, the number of packaging derivatives that the plant has to make now is dramatically different than it used to be, and that has implications for the kinds of capabilities that manufacturers need to be competitive, cost-effective across this much broader product range, but also effective in other dimensions.

So, you all know about many recalls that have hit the pharmaceutical industry, for example. Many of those are actually tied to increased product variety that some of these plants are being required to make.

Another key trend is around technology. So, this picture is quite important. This is actually the first acoustic guitar that was made with 3D printing. So, as you think about technologies, innovation in materials, innovation in product design and in the way that we understand consumer segments, like social media, think about innovation in production processes, which could be 3D printing, but many other innovations as well, innovation in information systems, so big data, what does it mean for manufacturers in terms of what they can learn and how they could take advantage of data to affect the way that they manufacture, and then finally, innovation in business models, so what is it that new services models that manufacturers are driving, or the circular economy in terms of actually products being reused and not thrown away.

These are all changing the face of manufacturing forever and companies that are able to understand these technologies and implement them into their design processes but also their manufacturing systems will be the ones who are most competitive, and these, again are important for both companies to understand but also countries to understand in terms of how they'll change the face of manufacturing.

This is just an example of, James talked about, the different segments. The one segment that is, in some ways, quite sticky in developed markets, is the global innovators for regional markets, and that first segment, which is a very significant share

of manufacturing value add and is driven by innovation, not by labor costs but driven by innovation and access to talent.

This is an example where you can see that, in fact, the countries that are most competitive on that innovation spectrum are the ones that are investing in industrial robots and the most advanced production processes and technologies.

Another key trend is the blurring of manufacturing and services. So, we're used to the public debate around manufacturing economy versus service economy, one's good, one's bad. In fact, there's actually much more blurred and the definition of what a service job is versus a manufacturing job is quite different than it might have been ten years ago.

If you look at the United States, for example, more than half of the jobs that are really coming from manufacturing are not production/assembly jobs, they are service related jobs. So, you can see, that's both service jobs in manufacturing as well as service jobs that are linked to manufacturing, that are generated by the manufacturing employment.

So, thinking about it as an either/or is no longer relevant. The real question is, how do we actually create jobs that are high paid and sustainable, whether it's services or whether it's manufacturing in the traditional way?

This is an example of Germany's economy. If you look at the exports that Germany is known for in terms of manufacturing export, actually what you see is that just as significant as the actual value add from the manufacturing component is the value add from direct service exports and also from the value add of services that are embedded in the manufactured products.

Finally, global competition, so, we all know that China and India are rising as manufacturing giants, as creating manufacturing strengths. What does this mean for a company in terms of what their best asset footprint should be? Certainly, as we talked about in some segments, the asset footprint has to follow where demand is, but in other segments, the asset footprint will follow where there are skills, and so as

countries gain skill and gain scale, they will become more attractive for all segments.

This is an example where it's actually important not only to look at value added, but to really understand the dynamics underneath. So, this is an example, if you look at the top five construction equipment manufacturers around the world, if you look at it by value, by dollar value, you see that Caterpillar is clearly number one in market share, 32 percent market share around the world, so, clearly, the global leader in this important segment.

But if you actually look at it by volume manufactured, and therefore -- and you think about the learning curves, the scale economies that are being achieved, et cetera, you can see that Caterpillar jumps to number four and Volvo doesn't even make the list.

So, dynamics changing dramatically in terms of who is building manufacturing know-how and capability in scale.

Finally, one of the most important trends that we've talked about is agility -- is the need for agility because of increased volatility, volatility due to things like Hurricane Sandy, which affected my state, agility required because of the demand fragmentation that we talked about and therefore the uncertainty in where demand will come from, what the forecast is relative to what actually happens, and the fact that the economy is so much more interconnected means that all manufacturers are much more dependent and fragile relative to changes that happen anywhere around the world.

This, again, requires companies to rethink how they do manufacturing.

So, what are the implications? The implications of all of this is that countries need to think about being competitive in the manufacturing economy in a very different way than they may have before. So, while labor costs are important, labor skills are just as important and, frankly, more important in many of the different segments we talked about and as we talked about new technologies, et cetera, growing skills to manage those technologies are going to be absolutely critical to success.

Demand expansion and proximity, again, for many of the segments we

talked about, being close to demand is going to be the critical determinant of where manufacturing jobs will be located.

Transportation costs are rising around the world and are increasingly an important element, which, again, works to keep manufacturing proximate to demand unless countries invest in infrastructure and support lowered transportation costs associated with their manufacturing.

Non-labor input is becoming just as important as labor inputs or even more. Capital productivity is growing far faster than labor productivity. So, companies that are successful are the ones who will be investing and continuing to drive capital productivity given gains.

And then finally, the business and regulatory environment, which will shape industries either to be truly global or to be more of a regional mix.

All of these factors are things that companies and countries must take into account.

From a company perspective we recommend the following: one is that companies have to get far more granular in the way they think about their manufacturing strategies.

So, I work with companies like many multinational companies that actually compete in multiple of the segments that James showed you, but they currently have a bit of a one-size-fits-all approach to thinking about their manufacturing strategy across all. This will require companies to be far more granular in thinking about the right asset strategy and the right approach for each part of their business.

Building agility, you see companies that are investing in Toyota's modular factories, for example, or more mixed model production, but also in skill sets around risk modeling and in agile leadership and the ability to make decisions in a much faster way in order to adjust and adapt to changes in the factor costs and other elements.

Skill sets in general are shifting in terms of what companies must evolve to to be successful. So, we talked about gathering new insights around the customer and

also around the supply chain and integrating that far better into the manufacturing processes and to be able to make manufacturing changes.

Creating much more integrated networks with suppliers and customers will also be critical, but also continuing to drive productivity in labor, as we described, but also in capital. So, this is not the end of an era of lean manufacturing, for example. In fact, lean manufacturing and other productivity enhancing approaches are even more important in this new world because only with that degree of control in productivity can companies then mix the pieces together to evolve as needed in the future.

So, this does require companies to have different global aspirations, to think globally, to act globally in a way that most multinationals are not yet doing, as well as a very important implication on the war for talent, the increase and the importance in skill sets required is an absolutely essential part of the landscape.

In many companies, you'll hear Jim talk about this later, the scarce talent to actually drive the kind of productivity gains and the strategy changes are going to be absolutely critical to winning in the new environment.

MR. MANYIKA: Well, I think, as we start to wrap up, and we are, after all, in Washington, there are some important policy implications to start to think about.

We're not, by any means, making policy recommendations, but we would encourage policymakers in the private sector to engage in a set of dialogues around a few different things.

We think it's important to take a segmented view to manufacturing, per something like the segmentation that we suggested, partly because, as you saw, the different clusters will respond to different policy recommendations and effects, and as you will see, there will be different parts of that landscape where, in fact, different countries, including the United States, can play to their comparative advantage differently.

So, we think it's important to take a very segmented, and, again, a forward-looking view that takes into account the trends that we described. And also being very clear about the goals as well as expectations, we think that one of the things

that's quite striking to us in our research is that, while of course we hope and we're seeing a resurgence in manufacturing and a rebound in manufacturing, it's important to keep those expectations in moderation.

As we saw, there's a circular trend here about what happens to economies as they industrialize and become service sector economies, so while of course we encourage and we'll hope to see a rebound in manufacturing, it's important to keep the right expectations about that.

We also think that for the first time, countries now have to realize that because of the significant contributions that having manufacturing activities in your economy make to things like GDP, innovation, productivity, and so forth, as we've described, there's now a new competition where countries are having to compete to have the most advanced manufacturing companies locate their activities in their countries, and different countries are going about this in different ways. You see countries that exploit the fact that they are proximate to large markets like the United States. You see countries that take advantage of the fact that they have abundant energy resources, you'll see countries that take advantage of the fact that they sit within trade framework, particular trade frameworks, which give them advantage.

So, we think it's important for countries to recognize where they can get comparative advantage and we think there's a lot here for the United States to learn from.

Clearly keeping track of the progress, and, again, keeping a forward looking view of this is actually very important. I think we're about to have a conversation about many of these aspects and, in fact, I'm going to hand over to Greg, if I can see where Greg is, Greg is going to moderate a discussion with the pretty illustrious panel, and I'm sure they'll get into the policy questions that we teed up. Thank you.

Do we want to take a few questions before we shift over to the panel? Sorry, Greg. Any questions? You could put up your hand for questions. There's one there.

MR. APGAR: Sandy Apgar, and as both a McKinsey alumnus and friend

of Brookings Metropolitan Policy Program, commend you for a very lucid analysis and presentation.

Two related questions. First, what role does the real estate itself, the sites, the plants, the labs, the offices, have in recapitalizing and repositioning industries, individual companies, for any of these trends? And second, are public/private partnerships important vehicles for linking individual companies, even sectors, with the city, state, federal, national goals that you've articulated?

MR. MANYIKA: Thank you for that question. Let me take those in reverse order because the second question, we think, has a quick answer, which is yes. We think public/private partnerships are important. Part of the reason for that is, again, back to this map. If you look at what happens with R&D intensity, much of that innovation happens in the private sector and it's hard to imagine, you know, a policy or at least the public sector making choices about the innovations and how the R&D is going to happen, so that's an undoubtedly an arena where private/public partnership is actually going to make a big contribution.

So, we think as you go through different maps, similar with the whole energy debate, which matters to these segments, so the short answer to the second question is, we think, yes, resoundingly so.

I think on the question of real estate, what we've found is real estate sort of follows the similar map to the capital intensity, although to a lesser extent. So, what you find is that, you know, if we had done a more granular view, many of the areas where capital intensity matters also happen to be places where real estate also matters into the equation.

So, we'll find that depending on which segment you're in, certainly when you're in the regional processing, for example, at least some parts of this around the food industry, for example, which tends to take a lot of real estate in terms of land use and so forth, that really matters.

So, what happens with policy around food production and the real estate

laws, if you like, that apply to that, makes a big difference.

So, we think that as you go through the segmentation you'll find places where what happens with real estate matters.

SPEAKER: Antoine Tenakmal. I wonder, in terms of your granularity, you put countries into two broad groups -- developed countries and emerging markets. If I look at this chart in particular, I wonder whether there would be an advantage to breaking down emerging markets, because they clearly fall into two categories, I think. Latin America being more on energy intensive commodity, you know.

MR. MANYIKA: Yes. Yes, in fact, there's a more elaborate segmentation that builds on this you could do for different countries. Even if you take even the category of labor-intensive trade-ables, because different countries, even developing countries, have different skill demographic profiles.

India, as you know, is very different from China and will look very different in the next 20 years. So, yes, there's a more elaborate segmentation beyond just developed/developing, if you apply this.

Can we take one more perhaps?

SPEAKER: Hi, my name is Michael (inaudible) and I have a question about your original graph that you had on employment figures for the manufacturing sectors across different countries.

I was wondering if you had taken into account the different crises that had happened over time, for example, the recent credit crisis that we have recently experienced, which caused massive layoffs across different regions in the United States. Did you take these situations into account in your analysis?

MR. MANYIKA: Yes, we did. So, one of the things we've looked at over time is actually what's happened to employment -- actually, we went back as far as the 1900s to look at just employment patterns over time, and one of the things that you find is that every time there of course is a recession or a dip in the economy, in GDP, clearly employment and manufacturing takes a dip, and in fact, employment and manufacturing

takes a harder dip and a harder hit, actually, than the rest of the economy.

But it also tends to be one of the areas, in advanced economies, that tends to rebound faster than the rest of the economy, so what you find is that you have sharper declines, but typically faster pickups across recessions.

There's a question in the back, I think.

SPEAKER: Thank you. My name is (inaudible), I am the special operations division person for the United States of Africa, 2017 project (inaudible).

You mentioned comparative advantage. What I want you and your co analysts to think, is that comparative advantage -- is that a theory, doctrine, ideology, or a law? You don't have to answer it now, but you can just think about it.

MR. MANYIKA: Okay. I'd be happy to have a conversation. I think we tend to be empiricists, actually, as opposed to ideologues in the work that we do.

I think one more question and then we'll --

MR. REYNOLDS: Andrew Reynolds, Department of State. One question within the report -- by the way, it's excellent. It's the first time I've had a chance to look through it, of course, but your correlation with non -- the terminology you used was non-labor inputs -- included energy, and energy is threaded through many of these five sectoral analyses, but if -- I think you can even go back to Keynes and say if you look at the long-term correlation between GDP growth and energy consumption, it's a rather close correlation.

So, I wonder if you could expand a bit on the energy side of these inputs. And also, if you wouldn't mind, exhibit 65, the circular economy, an approach for resource constrained in an environmentally sensitive world, because I think on an absolute scale, if consumption continues, the absolute consumption of energy will continue greatly, and what does that have as implications for the climate, if you will? Thank you.

MR. MANYIKA: Well, thank you for both questions. I think your second question requires a longer conversation that we probably don't have time for, but I think on the first one, which is the role that energy plays into these different analyses that

we've done, we took the view of trying to understand where energy intensity really matters to the economics of companies choosing where to locate activities, and that's what you see in this picture and clearly matters the most with this group.

And the reason we took that approach is because, in addition to the analytical work that we did, we actually spent the time trying to understand particular choices that companies had actually made to locate activities in different places and how much considerations of the economics of energy factored into their decisions.

And while it matters everywhere, it mattered the most for the ones that we've highlighted. And so that's how we sort of took that into account. And it's also the reason why we're quite optimistic that if, in fact, we do have a breakthrough, which I think we're starting to have on energy use in the United States, that will help manufacturing, particularly those activities.

Keep in mind also that if you look at the overall size of the trade deficit for the United States, a significant portion of that is actually driven by energy. That drives the majority of the trade deficit that we have, so not only -- so, therefore, progress on the energy front will not only help the economy as a whole, from a trade deficit standpoint, it will also benefit manufacturing quite directly, especially that segment in the middle.

I'd be happy to have a conversation about your second question. That's a longer conversation.

Well, let me hand over to Greg who's going to moderate an illustrious panel, but thank you for your attention and happy to take questions after the meeting's over if some of you have them. Thank you.

(Applause)

MR. IP: Thanks very much, James and Katy. This was a terrific presentation. I always look to the McKinsey Global Institute for really substantive, high calorie, thought-provoking material. You did not disappoint. I mean, I thought manufacturing had been dealt with at length and you really did bring forth some new and thought-provoking insights here.

We have an excellent panel here to explore, in depth, some of the implications of this report.

To my left is Martin Baily. He's senior fellow and director of the Initiative on Business and Public Policy here at the Brookings. I've known Martin for decades now and throughout that time I've always looked to Martin as one of the leading thinkers on issues of productivity and so forth.

To Martin's left is Bruce Katz, who you all know well. Bruce is also here at the Brookings. He's vice-president and co-director of the Metropolitan Policy Program where he spends a lot of time with policymakers, companies, and nonprofit groups trying to figure out how to promote prosperity in local economies.

And to my far left is Gardner Carrick. He's vice-president of Strategic Initiatives at the Manufacturing Institute, which is the nonprofit educational arm of the National Association of Manufacturers. He spends a lot of time on public policy issues, especially in terms of human capital development.

Before that, he was at the Department of Labor where he headed up a major project designed to nurture the development of talent in regional economies throughout the United States.

I'm just going to start out by asking our panelists wide open questions, and all of you, once we've done our first round, feel free to like, you know, jump in because I want this to be a conversation.

But Martin, I'm going to start with you. In the biography of Steve Jobs, there's a very, sort of, poignant anecdote where Barack Obama meets Steve Jobs and says, "How can we get some of those jobs back to the United States building the iPhones and the iPads that are now done in Asia?" And Steve Job's response was, "Those jobs are never coming back."

And that's kind of a discouraging, but not uncommon sort of, observation and raises the question, well, it's all very well and good that in certain areas, manufacturing in the United States is doing very well, but the common American -- the

American in the street and the American policymaker doesn't see it filtering down to broader based prosperity.

Why is that? And is there a solution to that?

MR. BAILY: Well, I think Jobs was basically right. Those particular jobs -- Jobs the person and jobs the jobs -- that he's right, we're probably not going to get those assembly jobs back. It seems unlikely that you'd get a Foxconn coming here in the United States assembling the iPhones and actually is not a tremendous amount of value added that's created in those jobs even though there are a lot of people working there. They're pretty much low wage, relatively low skill jobs.

But I think one of the things that was interesting in this McKinsey report, and I should say, I was involved somewhat in working on the report, so I'm not just an independent observer, but I thought one of the things that was interesting that came out of the report was this segmentation, so that you've seen this big decline in employment in these global technology industries, basically electronics and Apple and computers and the laptops are all made in China, but a lot of the jobs that remain and a lot of the value added that's here, is in other segments, and those are places where I think the U.S. can potentially increase output, and to some extent, may be able to increase the number of jobs as well.

So, the technology companies that innovate for the regional areas, for example, things like autos, precision machinery, certain chemicals, those contain a lot of employment and I think where the U.S. is, at the moment, doing fairly well, you're seeing exports rising. We've trimmed out a lot of the part of the economy that's not so productive. So, we're highly productive and I think we can compete as long as we get some of the sort of necessary factors to do that.

So, I think there's a hopeful story that's being told here, which is, if you're in the right segment, we could potentially see some growth.

So, what do you need? You need skills, and others on the panel are going to talk about that. We need to get the exchange rate right, which is one of my

bugaboos, we can't, sort of, fight the exchange rate. We have to get an exchange rate, which the U.S. can be competitive.

But beyond that, we do need the technology and the innovation, I think policy can play a role there, innovative companies can play a role. It's really an innovation game. They have to stay ahead in the value chain. And then some of the best companies, some of the most innovative companies -- and we're going to hear about Timken later -- are in a position to potentially expand, reduce our trade deficit, and maybe add some jobs as well.

MR. IP: Bruce, one of the points the report makes is that manufacturing is not monolithic even though in the popular jargon often refer to manufacturing and everything else, there is a wide variety of types of companies and skills involved, and I guess it would probably be true geographically as well. Can you speak to that issue a little bit, the how -- what a particular local area might specialize in will differ and why?

MR. KATZ: First of all, I just want to commend McKinsey for an excellent report, and we did a report earlier in the year, May, called "Locating American Manufacturing", so the kind of differentiation you see here by groupings you also see across the United States. You see it both differentiated by parts of sectors of manufacturing that are either relying on very high technology or those that relied on moderately high technology, and then you just see it split out by aerospace, by automotive, by high precision instruments, chemicals, manufacturing, food processing, and so forth.

So, really the most important thing for a particular city or metropolis then on up to the state level is to know yourself. I mean, to know which segment of manufacturing that you have a competitive advantage in, what kind of assets do you have, and we're not just talking about firms here because what you're seeing, really, is a geographic clustering where firms large and small really interact on a fairly regular basis with advance R&D institutions, whether they're private or public, with skilling intermediaries, with community colleges, even moving back into the high schools in some

parts of the country, and then with specialized firms that might provide strategic advice or even customized capital. I mean, that's what clusters do. They make two plus two equals five because you have a thick labor market and you have this dramatic interplay between production and innovation all across the continuum.

So, I think going forward what we're seeing -- and frankly, it's because the recovery has been so sluggish, I mean, if this had been a bounce back kind of recession, I don't think you would have seen city and metro and state policymakers begin really to shift their focus away from what had been a Starbucks and stadia focus, you know, let's build the next performing arts facility, let's build the next convention center, let's build the next sports stadium -- I mean, they're really beginning to focus now on what really matters to people and place and it's across this really interesting continuum of innovation and skills and land capital infrastructure.

MR. IP: Thanks. Gardner, one of the most striking findings, I thought, in the paper, was in the discussion of human capital. There had been -- they did a study, I think, last year, around the world and the United States. They found like 30 percent of American companies identified shortages of skilled workers, but among manufacturing, it was 43 percent.

Now, after a period where manufacturing had been in almost continuous decline employment-wise for over a decade, I find it really quite amazing that so many manufacturers still have talent shortages. Why is that and what do we do about it?

MR. CARRICK: I think two answers to that. Number one, why is that? Couple reasons. Over the course of, really, a generation or two, you have seen manufacturing employment decline and that has led to really an undesirability of the occupation, so you don't see as many people pursuing manufacturing education. That means that the education programs that prepare students for manufacturing respond to that and begin to shrink or ultimately go away.

So, you're really seeing both of those inputs conspire or a confluence of them to really reduce the opportunities to learn the skills to go into manufacturing.

At the same time you're seeing a pretty significant increase in the level of skill required to have a job in manufacturing, and we're not talking just about the engineering here, we're also talking about the production level positions. These individuals are working with computers, they're working with automation, they need to know both mechanical and electrical systems, they need to be able to machine parts to a very specific toleration.

So, you're talking about simply much beyond this typical assembly line job that was available and kind of the nostalgic manufacturing position of the '50s, '60s and '70s where you graduated from high school and went down to the mill and got a job and 40 years later you retired.

So, all of those events have really come together to mean that manufacturers really aren't able to find individuals to fill these highly skilled positions, they're just simply not really out there.

So, we've been able to get away with that over the last 10 or 15 years because you have seen basically a declining trend in employment and the demographics of the workforce didn't really come up and bite us yet. Unfortunately, over the next five or ten years, we're not going to have that same luxury. You're really seeing most of the -- or a large percentage of the production workforce is at 55 or above, and that happens to also be where the real institutional knowledge about how to work these machines and how to really understand how to produce what resides.

So, as those people begin to retire, how we're going to replace them is a great concern for the American manufacturing industry.

MR. IP: But, you know, I read that like college enrollment is at an all time high these days, you know, back -- one of the few bright spots is that the proportion of high school graduates going on to post secondary is also at an all time high. It's nice to know that market signals actually do work, and yet, is that -- are the people that are going into these programs and the kind of programs they're going into, the types that will eventually meet this shortage, or is there a real, you know, disconnect in the actual

education policies and supply of educated people.

MR. CARRICK: I would say that there has been a disconnect. We are really working hard to try to connect, if you will, so that -- community college enrollment has gone up, trade school enrollment has gone up. Well, how do we ensure that the programs and the skills that they're learning there really do meet these positions that are open, the skills that not only do we need today, but really enable you to learn the skills you're going to need five years from now.

So, the Manufacturing Institute has been working very hard with a hundred something community colleges to make industry-based certifications a standard part of their curriculum, so that many of certification bodies have stackable credentials, so you start off with an entry-level one and you're able to return to school and work your way towards middle-level and advanced-level certifications.

So, I would say the community colleges are responding to the market signals of manufacturers saying they're unable to find workers, and some of those are easy to adjust, some are more difficult because to really do an effective manufacturing program, education program, you need the right equipment and that isn't always cheap.

MR. IP: Bruce, why don't you --

MR. KATZ: You know, when I went to high school, a long, long time ago in a galaxy far away, you know, we used to have something called shop. In fact, we used to have special high schools that were focused on preparing students for trades in that particular city or metropolis. We got rid of that as we sort of went on this nirvana march to the post-industrial economy.

And I think what's beginning to come back, particularly because of the retirement of industrial workers in many parts of the country, but also because there's a sense that, you know, the President called for a million new manufacturing jobs over the next four years, when you really begin to break that down into a particular city or metro, you may be talking about 10-, 15-, 20,000 jobs, right, in relatively medium-sized metros.

Well, where are those workers going to come from? There's a new high

school in the west side of Chicago, and the west side of Chicago has always been a manufacturing hub for metal manufacturing companies, called Austin Polytech, and their goal, working with firms and companies who would bring the special equipment into the high school, is to begin to prepare students to literally have the credentials by the time they leave a four-year high school experience, to go into a particular firm on the factory floor.

Now, these are kids on the west side of Chicago, 98 percent African-American, many of whom are coming into ninth grade with third or fifth grade reading and math, who can leave with jobs that are paying $50- or 60,000.

So, we're going to have a proposal coming out of Brookings Metro called "Race to the Shop" that hopefully can complement "Race to the Top" because we need to have a broader sense of the kind of education and skills that our workers need to have to participate in what is one of the most innovative and productive segments of the economy.

MR. IP: Hopefully, this won't get mangled on the way to Congress as "shop 'til you drop".

MR. BAILY: If I could just chip in a comment, and I don't want to rain on anybody's parade, but we really -- there really is an underlying problem here, and that is that people -- the level of education has not been rising. Yes, we've got high enrollment now with the recession as people are going back to school, but the trend has been very flat, and I think even for young men, has been going down. So, it's a pretty big challenge we face in terms of completing high school, completing two-year colleges, completing four-year colleges, and, yes, the incentives are working, but not as much as one might have expected.

I mean, the return to education is very high, but a lot of young people are not going or not completing the school when they get there. So, I think we have to -- you know, these things are very encouraging, but we're building from what's been a serious problem.

MR. IP: It seems there's also a real polarization in terms of the skills that are needed. I mean, the global innovators, the segment that you pointed out the United States excels at, these are people often with graduate degrees, you know, and those employers are complaining not about a lack of community college graduates, they said, we want PhDs, we want engineering -- masters in engineering, that's why there's so much pressure from the business sector to loosen immigration because they feel that, you know, we can't get them here, we'll get them overseas.

So, how do the things that you have been talking about here solve that shortage?

MR. BAILY: You know, McKinsey has to be careful about talking about policy, but speaking here at Brookings, I think we're generally believers that we need more high-skilled immigration, and that actually is complementary with getting other kinds of jobs in manufacturing in other areas too.

MR. KATZ: It's also segmented, though, Greg. When we put out our report on the spatial geography of manufacturing, there's a cluster of very high-tech manufacturing segments. More than 30 percent of the employees are engineers. There's another segment, practically a bigger segment, where only 10 or 12 percent of the employees are engineers.

So, a lot of this will get back to the customization of skills training, both at the national scale, but also city and metro scale. But I totally agree with Martin. This is about investment in STEM, this is about having a much more liberal approach to high skilled immigration, but when we go out there and talk to companies and we talk to the business associations working with these companies, they consistently say, if we don't deal with this workforce problem, we're going to miss an opportunity here, I mean, a real opportunity to grow manufacturing in the United States.

MR. IP: Gardner, did you want to --

MR. CARRICK: (off mic)

MR. IP: Just levering off that point also, the report is very persuasive in

saying that the type of jobs that we think of as manufacturing, is often actually very small or a shrinking share of manufacturing employment. Many of these jobs are in marketing, they're in services.

It brings to mind, there was a piece in *The New York Times* this weekend about the app economy, I mean, all the people who are writing these games and software applications for iPads and iPhones. There was a study by the Progressive Policy Institute that said there could be 500,000 jobs in this segment alone. And we probably wouldn't have thought of those as manufacturing jobs, but they're part of the ecosystem that began with manufacturing, which is the production of these products.

So, to me it raises the question that how quickly can policymakers and colleges respond with supply of people when the type of demand that they're likely to encounter is changing so rapidly? And this goes to the point that you're making, James, about the speed of product cycles, the explosion in the number of -- differentiation in products.

It just seems that we talk about wanting to supply more of these types of people, but trying to keep up with the dynamic nature of demand must be very difficult.

MR. CARRICK: I would say that you're really talking about the agility of the workforce here, and, you know, colleges are never going to be able to respond as quickly as companies in the agility of the workforce. What companies, in our experience, are looking for, are individuals that have a basic manufacturing education and have a problem-solving ability that allows them to identify and quickly work with them on this environment.

So, companies are going to be able to train individuals in new technology and they're going to -- that really is their responsibility, but it's more difficult for them to train individuals when there's little or no foundation from which to train from, so if they don't know how to machine or they don't know how to weld or they don't understand the basics of mechanical and electrical properties, then training them in the next generation of that becomes nearly impossible, whereas if we're able to provide them with those

foundations, they'll pick up the training from there and really keep up with those technologies, and then community colleges and others can respond at a slower cycle, but still keep up in the long run with those changes.

MR. KATZ: My sense is, you know, there's no one intervention, but I think what's happening in the United States, is because of the involvement of foreign companies, particularly German companies, and you see it with Siemens, you see it with Volkswagen, you see it with Mercedes-Benz, BMW, they are essentially bringing the German model over to the United States. They're bringing it with regard to workforce and you see that particularly with the community colleges like in North Carolina.

I think they're increasingly bringing it with regard to product innovation, because this network of Fraunhofer Institutes in Germany really allows for cracking the code on technology innovation and really interesting collaborations between universities and companies and business associations.

And, frankly, they're bringing it with regard to exports. The United States under performs on exports, and frankly, we under invest in export promotion and finance. There was a gentleman from the State Department here. We don't have enough firepower on the ground in many of the emerging markets so that our small- and medium-sized manufacturers can actually understand those markets and begin to sell their products into those markets.

So, I think the introduction of foreign companies into the United States, which is actually a pretty large portion of our manufacturing base, is beginning to educate us about how to educate our workforce in some really interesting ways.

MR. IP: You know, I'm going to go from the point you just made about exports, to lead us from the micro to the macro, which we haven't actually talked about much. But in the study they explore why is it that the manufacturing share of GDP is 7 percentage points higher in Germany than it is in the United States and fully 5 points of that difference relates to global imbalances, the fact that Germany persistently runs a trade surplus and we run a trade deficit.

And so, all these microeconomic initiatives are helpful insofar as they go, but it strikes me that until you deal with those imbalances, there's an enormous headwind to overcome, and part of that is exchange rate, right Martin?

MR. BAILY: Yeah, I mean, exchange rate is not a policy variable, at least not for the United States, but our level of national saving is, and so if we are less reliant on foreign capital, then we're more likely to get a balance in terms of the flow of capital and in terms of our trade and get an exchange rate, which makes us more competitive.

Now, that may mean -- this sounds like heresy, like maybe we have to have a little lower dollar in order to be more competitive, but I think it's important that we do get our trade back to being balanced.

The Germans, I think there's a lot of things that they do right. They do have a lot of the skill and training. They haven't sort of gone down the Silicon Valley road. In some ways they regret that, but it means that their production is much more concentrated and machine tools, precision machinery, high quality automobiles, stuff like that, relies on their workforce to produce it, and so they tend to be much more willing to keep producing at home in Germany.

But the other thing they do is they save. They're an economy that saves, and we're an economy that doesn't save, our government doesn't say that it saves, our companies do save, but our families don't save that much, and so we do need to change our ways a little bit in that saving/investment balance to get the macro picture right in order that the micro picture can work.

MR. KATZ: We're also a country that -- our version of industrial policy is to invest in homebuilding, right. I mean, you look at the mortgage interest deduction, you look at all these other tax expenditures, they really tilt the playing field to consumption in the housing sector --

SPEAKER: We're not doing so well on that front right now.

MR. KATZ: Doing a heck of a job. But I think we do have a moment with

this fiscal cliff and the broader fiscal crisis that we have, to reset our national priorities and begin to shift from investments in housing, particularly at the high end, frankly, to investments in innovation, investments in human capital, investment in infrastructure, and I think that really has to happen as we move forward. So, "Cut To Invest" is sort of our mantra. It's not enough to get the federal fiscal house in order, we really need to reset national priorities.

MR. IP: Gardner, do you have any thoughts on that broader macroeconomic story?

MR. CARRICK: Yeah, I think that -- you mentioned both the Fraunhofer centers earlier and this idea of industrial policy, and the government is kind of loathe to do that, and when they do wade into it, they tend to do it poorly. Over the course of the last year or so, the White House and their team, did lead an effort to come up with this idea of a national network of manufacturing innovation centers, and it really is modeled on the Fraunhofer centers and they funded a pilot institute focused on manufacturing in Western Pennsylvania and Ohio, and I think that that is an industrial policy that is not about picking winners and losers, but it's really about creating the infrastructure to allow more winners to emerge.

So, it's really this idea of pre-commercial research and can you bridge the gap between university research and company commercialization, and it's in the middle of the rest of the discussions on the Hill right now, but I'm envisioning a network of 10 or 15 or 20 of these centers that really are about high technology manufacturing research, I think, would put us -- is the right role for the government to play and would put us on a path to continue to focus on the innovation required to compete.

MR. BAILY: Can I just say a quick -- I think we admire a lot -- I admire a lot of things that Germany does in its manufacturing sector, and its training and all the rest of it, but, you know, Germany's big trade surplus is with the rest of Europe, so right now, one can say, yes, it's maybe a little bit too much of a good thing. They're sort of killing Greece and Spain and the other parts of Europe, so I think they've got their own

imbalance problem just as we have an imbalance problem.

MR. IP: Actually, James, I think you told me that a big portion of our trade deficit is energy, and of course, there's been a pretty exciting story on the domestic energy front in the last few years with the collapse in natural gas prices as fracking and shale gas spreads, the unlocking of enormous supplies of unconventional oil.

I'd like to ask the panelists whether they have any thoughts on what are the implications of this domestic energy revolution on the future of manufacturing here in the United States.

MR. BAILY: Well, clearly, it's a plus. I mean, it's already true that energy is cheaper in the United States than it is in Europe or in many other places we're competing against. It's having an effect already in terms of investment in petrochemicals and plastics and stuff like that, which are the energy intensive parts of manufacturing, and I think it will make all the manufacturing a bit more competitive if we do this.

And by the way, we need to do it right, getting the environmental part right.

I don't think we should go overboard and I think James said this, in terms of the number of jobs it's likely to create, it's not a huge part of total costs for many, many manufacturers, and so it is going to be, yes, a little bit of a competitive edge, but we're not suddenly going to start making t-shirts and children's clothing again. But it will certainly help.

MR. KATZ: I also think it's a product of technological innovation, which, you know, we seem to skip past that point. Any time people talk about America's energy revolution, sometimes you think it's like the *Beverly Hillbillies* or something and you're, you know, going in your backyard and discovering oil spurting up.

So, this is really about decades-long innovation to literally access --

MR. BAILY: The Energy Department did some of that and the small wildcat drillers did quite a bit of it, so it was a decentralized innovation process.

MR. KATZ: Absolutely.

MR. IP: I think the other thing that's often forgotten is how the sudden availability of a cheap factor suddenly makes business models and business innovations possible that weren't possible before. LNG now, gas liquids, people are talking about things they didn't talk about before, just as the collapse in broadband prices made business models possible in the B-to-B space that people wouldn't have conceived of before, it will be interesting to see what, you know, the amazing entrepreneurial spirit in this country comes up with over the next ten years.

I wanted to actually go back to the jobs question for a moment because I keep hearing how we're supposed to lower expectations on employment. You know, everybody prefaces their remarks by saying, well, we shouldn't expect a big bounce back in employment. Well, President Obama doesn't seem to get the message because he keeps talking about a million new manufacturing jobs over the next four to ten years.

How realistic is that a goal? I mean, should we really give up the possibility that manufacturing will be a significant source of employment growth? Or what would your own forecasts be for manufacturing employment in this country?

MR. BAILY: Well, I'm looking over at Siri, who was one of the people working on these various manufacturing projects, and we did an exercise trying to say what could the different possibilities be, this was on the jobs project, could be for manufacturing, and it's pretty difficult to run a scenario in which the number of manufacturing jobs ten years from now is significantly higher than it is today.

I think there will be with a cyclical recovery --

MR. IP: Isn't a million significantly higher?

MR. BAILY: Hard to get a million more, I think, I mean, who knows what the future will hold, but it's pretty hard -- you can see plenty of scenarios where employment actually would be lower ten years from now, so if you think of the share of -- I mean, you've seen the trend line, James showed you the trend line, the share of employment and the absolute numbers of employment tend to trend down, so you're fighting that trend.

If we do really well we can sort of fight the trend and maybe hold manufacturing a constant, but it's tough to get a substantial increase.

MR. KATZ: I mean, the big number here in terms of the jobs deficit is 11.1 million jobs. I mean, that's the number of jobs it's going to take to basically make up the jobs we lost during the downturn then keep pace with population dynamics, and, you know, it's going to take us either through the end of 2016 if we had 1990 style growth, or to the end of 2020 if we have 2000 style growth to make up this deficit.

So, let's assume you take the President's million jobs goal, it's only a relatively small portion of the bigger number.

I do think that this is about something different, which is about setting a platform for more jobs, you know, in the rest of the economy, so, you know, housing doesn't create jobs in the same way that manufacturing creates job, with the multiplier effect, and you know, across this broad continuum, both within the sector and then outside of the sector. And we've lost sight of that.

So, I think what's going on in the U.S., frankly, getting back to your macro questions, is really a behavioral change in what is the narrative about the shape and structure of the U.S. economy. For a long time, it was, we'll generate the ideas here and someone else will produce them somewhere else, and we've almost convinced everyone -- and it really gets to your point -- that we didn't make anything anymore, which is just, you know, nonsense. Absolute nonsense.

But literally, we convinced people that the U.S. did not make anything anymore, and I think what's happening right now in the aftermath of this recession is we're going back to some basic and fundamentals about how you build prosperous, robust, and resilient economies, and that may create some new opportunities, frankly, that we can't quite anticipate, the same way you were describing the app disruptiveness.

MR. CARRICK: Well, tough to look at the crystal ball and disagree with the experts, but at the same time, I mean, I do think that it should be a priority to not allow us to continue just down the expected decline slope, because, you know, for all the

reasons that have been stated, manufacturing has an outweighed importance in terms of its impact on everything else.

But, you know, how do you do that? I mean, you've got to really set up the best possible policies that allow you to -- not only allow you, but really encourage these jobs to be here, and that means everything from the workforce side to the taxes side to the regulation side, really, the entire package, because when manufactures are deciding where to locate, they're looking at the entire package.

MR. IP: You raised a tax question. Perfect. How could we have a panel discussion at the Brookings Institution in this month, in this period, without bringing up the fiscal cliff and all the discussion about the big changes that are going to have to be made, or so we're told, in spending and tax policies in this country.

Now, notwithstanding the McKinsey allergy to getting deep into the policy weeds, I think it's essential to address this question, because, let's talk about tax reform for a moment. The President has a corporate tax reform proposal out there that would involve lowering the top corporate rate, but he would leave in place the current worldwide system for taxing corporate income around the world, whereas among the business community, going to a territorial system is very important.

There's, whenever we talk about tax reform, business always loves the idea of lowering the rates, but when we talk about the tax breaks that we have to take away in order to pay for those lower rates, not so much enthusiasm. One of the biggies is, of course, accelerated depreciation and the domestic production activities tax credit, two biggies, which are very important to the manufacturing sector. Should those be sacrificed in pursuit of a simpler corporate tax system? I'd like to start with you Gardner.

MR. CARRICK: Well, I'm not going to comment specifically on those proposals, I'm going to have to defer to my NAM tax team, but broadly speaking, look, we have the highest corporate tax rate in the world. That certainly does not encourage companies to locate here. We have a system set up to where the large majority of manufacturers actually file at individual rate, not at the corporate rate, so if we're going to

raise taxes on high income or high earning individuals, what's that going to do to manufacturers?

I think all those things need to be taken into account because you're really talking about hurting these job creators and if you can -- I don't think manufacturers are looking for bigger breaks to locate in the U.S than anywhere else, I think what we're hoping for is a level playing field, and right now the rest of the countries, both developed and emerging, are aggressively trying to improve their playing field and we seem to not be doing that.

So, whatever the outcome is, we'd love to see it be more on par with what our competitors in other developed countries are doing.

MR. IP: Yeah, the question isn't so much whether you should have bigger breaks, but whether you're willing to give up the breaks you already have. However, I appreciate that this is an issue where I may -- we have to take it up with your tax colleagues, but I'd like to hear what Bruce and Martin have.

MR. KATZ: I know Martin will talk about the direct question, so I'm going to sort of move to the side and say, we better be talking about investments at the same time we're talking about tax rates or certain special treatment.

I mean, just going back to the prior conversation, companies are basically saying, we don't have skilled workforce. Okay, well, that deals with investments in public goods, whether it's at the high school, community college, or skilling level. Infrastructure, particularly around our major ports, has basically had deferred investment for a long period of time, and frankly, of all the areas, this is probably where the federal government has been stuck. They can't seem to move new public/private financing vehicles, really, at scale, and we're seeing sort of a flat line of the subsidy interventions, to the point where states and locals are just making it up by themselves.

And in innovation, we would argue, particularly in the clean energy side, that we are not investing at scale over sustained period of time in clean energy R&D.

So, I would just say, we always tend to have a conversation about taxes

without having a conversation about investment, and we need to have a unified conversation here or else potentially we're going to really miss the opportunity.

MR. IP: You mentioned public-private partnerships on infrastructure. Can you mention a couple of models that you think would work well with the United States either here in the United States or overseas that provide a promising route pursue?

MR. KATZ: Well, I think the rest of the world has done more in this score. I mean, you know, as an urbanist, we particularly look at the build out of transit systems around the world and, you know, they don't have muni markets, they don't have a sophisticated capital system, so you see -- I'm going to Brazil in about five days, you know -- some of the new transit systems in Sao Paulo have obviously been built with public/private financing, the sort of toll box revenues being used to support, to some extent, the private sector capital.

We don't do that as much in the United States. I think what we're going to see -- and you see it in Michigan now, frankly, with the bridge building that they're trying to do across the Detroit River, where the Canadians essentially put up the capital and then the tolls would go back -- you know, would be used to pay off the debt.

Look, the bottom line is if we do not scale up public sector investment in infrastructure, whether it's for roads, whether it's for bridges, whether it's for transit, whether it's for other, you know, segments of infrastructure, we're going to have to do public/private and much higher scale. I mean, that's why we've been pushing notions of having public/private expertise within the Department of Transportation, having it at the state and the local level, and beginning to test and assess models, but the models are mostly outside the United States, frankly, and not within the United States.

MR. BAILY: Well, as others have said, we need to cut down on consumption, particularly healthcare is sort of killing us and is going to kill us, so dealing with the fiscal problem is going to be --

SPEAKER: Ironic, killed by healthcare.

MR. BAILY: Ironic, killed by healthcare. Sorry about that -- but controlling the cost of healthcare is a big part of the solution.

We do have to raise taxes, I think there has to be more tax revenue to make this thing work, so we're going to tax people, we're going to tax corporations. You know, from a -- we also have this at the same time as the sort of income distribution is exploding, so I think the politics is really tough. Businesses are mobile, manufacturing companies are mobile, so we have to set tax policy, whether it's territorial or whether it's rates, in a way that makes locating in the United States attractive.

So, we just have to do that, but then that means we're going to have to pay taxes in another form, whether it's a value-added tax or some other form of taxes.

So, I do think we need to address the corporate tax problem and in recognition of the fact of the mobility of companies that they don't have to come here if they don't want to.

MR. IP: I'm going to now open this up to questions. If you have a question, please raise your hand. We have a couple of people with microphones who will bring you a mic, and please state your name and your affiliation at the outset.

SPEAKER: Antoine Tenequa. I actually want to do a very dangerous thing, which is to take on Steve Jobs on jobs, and maybe a little bit also, Martin. First of all, I wonder whether Steve Jobs would have given the same answer today as he did a few years ago on this issue because the situation has really changed quite dramatically if you specifically look at the company that produces these iPhones and iPods, which I know quite well, they've had real problems in terms of strikes, in terms of all kinds of -- and have had huge increases in wages.

It seems to me that for us not to focus on this area of industrial automation is giving potential cheap hanging or low hanging fruit away. I think it would be enormously stupid, actually. We should really be focusing on there and it should be possible.

Now, you could argue that there is not a huge amount of job creation,

but, you know, you have to make these robots, you have to install them, you have to maintain them, and more importantly, if you don't -- if you lose the ability to use these things efficiently and leave that (inaudible) that could be very dangerous.

So, I want to see what you thought of that and whether you believe there is some potential in there.

MR. BAILY: I certainly don't think you should give up on any area, and there are some places where because of problems in supply chain, problems in, as you say, strikes and so on, that companies are deciding to bring back activities to the United States that they wouldn't have brought back before. So, I'm more than happy to be sort of proven wrong on that. I certainly think our policies should be welcoming and encouraging to that happening.

I just think if you look at the trends, probably the better places where we're going to get growth of value added and growth of jobs is in some of the regional processing industries and some of the precision advanced manufacturing industries, those seem to be the most promising places.

MR. KATZ: You know, Antoine sort of raises another point, which is, we can't really anticipate what the innovations in our military manufacturing may have for civilian manufacturing. You know, and I was with a CEO of a large Japanese company a couple years ago and he sort of said, what do you think you manufacture, and I tried to start responding with the usual sectoral response, and he says, no, no, you are a military manufacturer and the innovations you make in that super sector begin to spill over in your civilian sector in ways you can't even imagine or anticipate.

The question is whether you capture it or whether others begin to use it. You know, in the U.S. that always tends to be sort of a provocative statement in certain circles, but the fact is, robotics, right, I mean, drones, right, I mean, think about all of these advantages or advances we're making on the military side, and what will that mean on the civilian side within a relatively short period of time?

MR. BAILY: We do produce a lot of defense goods, manufactured

goods, and we export them, so that is an area, as you say, it can be a little embarrassing to talk about it, but the U.S. is pretty good at making military stuff.

MR. CARRICK: I would say that your larger point about why not compete for a factory that is almost entirely automated, run by robots, where the labor inputs are really just about maintenance, essentially, after you build it, yeah, that at the top level, makes a whole lot of sense.

Now, whether the iPhones are that or not, I'm not sure I could answer that directly, but that should be a space that we should be able to compete in and we should take advantage of because you're going to have a pretty large transportation cost as percentage of unit cost for something like that if you're going to float them from China or somewhere else in South Asia.

SPEAKER: Just quickly two more things on that, which is why I thought the situation was different maybe five years ago and today is if you look at the wage increases in these factories, they have been, over the last five years, and I saw your numbers, which are more general, but in these particular factories, they have been well over 100 percent -- well over 100 percent -- so that decreases the gap. And interestingly enough, it's Hon Hai that is the largest buyer of industrial automation -- of robots now, not us. That's missing a huge chance.

MR. MANYIKA: Well, I think one of the things that's interesting about that particular sector you're talking about is, we're starting to see a huge spike up in investments in industrial robotics quite significantly and so I think when we think about this question of the implications for employment and the Steve Jobs question, we should keep two things in mind: we've got globalization on the one hand of these activities, then we've just got the technology innovation and automation. If you haven't seen, there's a wonderful book by Erik Brynjolfsson and Andre McAfee called *The Race Against The Machine*, which basically argues that over time, we are going to see technology, in fact perhaps even more so than globalization, really affect how we think about employment. And so that's the argument.

So, whether Foxconn or whoever it is locates here or not, we will see robotics and automation enter those factories in a very significant way, which goes back to the point I think several of us have made, which is, it's important that we think of, again, employment in this sector beyond just the assembly line, because I think a lot of that may get automated, but think more about the other activities that are more service like.

I'm quite struck by the fact that if you take a category like engineering design, that's actually counted as a business service in the way we count the economy when, in fact, engineering design is probably more closely related to this sector than anything else.

So, I think a wider definition of what we think of as manufacturing activities is really critical to this conversation.

MR. IP: I would also just add arithmetically that there's a lot of discussion of rapidly rising wage rates in China, but the data that I've seen suggests the productivity is nicely keeping pace, so there really hasn't been a lot of diminishment of unit labor cost.

So, Hon Hai might end up having fewer employees by using more robots, but that doesn't necessarily mean there will be more workers in the United States, it just means there's going to be more robots, but they're going to be there, not here.

We have a question here.

MS. WAGNER: Stacy Wagner, I'm with the Manufacturing Extension Partnership and I wanted to say thank you for your last comments because I think that is where it's going and we haven't been really touching on the fact that technology acceleration has been very uneven among small manufacturers for the last 20 years and so it's been very difficult, one, for the education system to understand what manufacturers needed in order to be able to train our workforce because the manufacturers didn't know as well.

The second part is, is that for a very long time, manufacturers, small

manufacturers, were deciding whether they were going to invest in technology or continue to have a low wage, low skill workforce, and they didn't make those decisions until they absolutely had to make those decisions, which is now.

So, now we're playing catch up in the educational system, we're playing catch up in the training system, and so this, I think, is part of the reason why we look at manufacturers now and we say, why they are having such trouble finding skilled workers.

So, that's one point. The second is to go back to the adoption of technology in the workplace and the way that that's changing, essentially, the factory floor so that we have always talked about manufacturing in terms of the workers on the factory floor, and with the adoption of automation, which we want to continue to see and which small manufacturers, because the democratization of this affordability of the technology, because of that, they are now starting to implement that in their small manufacturing operations.

And so, if you talk to small manufacturers they're saying, frankly, we are more interested in the people who are the design and materials manufacturing, we are not employing as many people in the factory as we would be where it's more important, in terms of what it is we're designing, how flexible the design is, what kinds of materials that we're using for this, where is our market going to be, that kind of stuff.

So, I think that kind of gets lost in the discussion around small manufacturing because we also, I think, tend to default to thinking of manufacturing -- you know, we talked about it being monolithic, well, we think of manufacturing as big manufacturing and we don't really understand that manufacturing is mostly small firms, which is where the business is now, because the supply chain is supporting the OEMs.

MR. IP: Gardner, do you find something similar in your own work?

MR. CARRICK: I do. I do. I think that, first of all, the point about what is manufacturing, you typically think of manufacturing in terms of the global brands -- Caterpillar and Boeing and GE -- but, you know, you look at 260-something thousand manufacturing establishments in the country and the overwhelming majority of them are

just supplying to other manufacturers. They tend to be totally out of sight from the general public because they're in windowless buildings off of the road somewhere and there's no appreciation that it's even there, much less that they're a manufacturer and that they're selling to, you know, the next guy down the road.

So, making -- having a general or better understanding and the public a better understanding of what is manufacturing is important to both dealing with the skills gap issue and will more people go into manufacturing, as well as making it more of a priority for policymakers and the public at large.

MR. KATZ: This is where the micro policy really matter because these firms are not big enough to be making the kind of strategic decisions. I mean, the hiring is done by the owner of the firm, right, so, just point in fact, the Manufacturing Extension Service is about a fourth of the budget of the Agricultural Extension Service, which is another indication that we have a federal government stuck in some different century.

So, I mean, we really need to think about changing what our national government does, not just everyone gets a haircut of 10 percent, which is what we're going to do in the sequestration if we don't fix the problem, but shifting priorities so they're more supportive of where the economy is going, where it's already gone, and, you know, if the feds don't do it, frankly, the states and the cities will be compelled to do it without the kind of fiscal base they need.

MR. IP: Any other questions? There -- take you, sir, just on the aisle. Yes.

MR. SANG: James Sang, question about Figure 19, which is the share of service type jobs in manufacturing. When the panel says that it's difficult to make the one million goal, are you talking about the more traditional jobs or the service sector jobs in manufacturing? Actually, a related question to the McKinsey group, given the last question on different size companies in manufacturing, how does that break down to service type jobs, in fact, vary with manufacturing company size.

MR. IP: Do you want to take that?

MR. MANYIKA: Well, in fact, if you take what we described as the service like jobs that are in manufacturing, those actually are evenly spread between large firms and small firms.

I think one of the interesting things, by the way, is that particularly if you take a look at what I was describing earlier, like the engineering design firms, those tend to be smaller firms, small- and medium-sized firms.

The other thing that's probably worth pointing out, and Martin will remember this, was we did some work looking at how multinational corporations operate, even for the U.S. ones, the sheer amount of intermediate products that they buy locally, typically from smaller firms, is actually very, very large. In fact, it's one of the things that we think deserves some proper measurement, because I think the numbers range from anywhere like 70 to 90 percent or something like that, of the intermediate inputs. And most of those inputs are coming from smaller firms who are suppliers to the large multinationals.

So, we think that's an important part of it. So, when you go back to the question of, you know, again, how much of a rebound and how much to the one million, I think I tend to agree with Martin. I think what we should see and we will see a rebound, partly because there is a rebound that will come just from the business cycle. We are in recovery and manufacturing tends to recover faster in recovery, but also if in fact we break through on the topics and things that are being described, like closing the skills gaps, closing the infrastructure considerations, doing something about energy, those will all contribute to tilting the choices that companies make to locate here rather than elsewhere.

MR. IP: I think we have time for perhaps one more question, possibly more, this gentleman here right on the aisle.

SPEAKER: What do you think about the possibilities that rather than integral to this it's attitudinal that we don't have the right attitudes in government, in industry, in the workforce? The Steve Jobs paradigm that was discussed several times

talks -- is really -- plays into something that they call the great man theory of history, and I'm brought to mind that they talk about the Depression, that this time it's worse, and our situation -- just, a catalyst, which we didn't need, took us from 40 percent unemployment to 100 percent employment where we were making five tanks a day in one plant that had never made anything automotive.

And so, we've -- we may be rearranging the deck chairs on the Titanic by addressing these things -- the things that we have been addressing, we need an attitudinal readjustment to solve this problem.

MR. IP: So, let me slightly rephrase that. Is the problem attitude, and if so, what attitude would need to be changed in order to make progress on this, starting with you, Bruce?

MR. KATZ: Well, you know, I think the U.S. tends to focus on the entrepreneur or the enterprise and not on the ecosystem. When you go down to the cities and the metros, what they focus on is the ecosystem, you focus on the firm in the context of a place that has good university, good community college, good high schools, innovative centers, you know, customized service firms, infrastructure that actually is first class as opposed to third class -- it's the whole package, right.

And, you know, Steve Jobs was able to, you know, basically grow his firm in Silicon Valley. Hello, Stanford, you know? Right? That might affect something. Thick labor market, incredibly innovative institution, networks that sort of grew up around it.

We just don't think about the ecosystem in this country and I think a lot of what we're describing here from our perspective in terms of where you need to invest, is in the ecosystem, to support enterprises and entrepreneurs, and that's how you have a prosperous country.

MR. BAILY: I think we need to change attitudes of government towards business and business towards government. Now, we do need a certain separation between business and government. We want to make sure we don't get too incestuous

there, but at the same time, I think we're really being hurt by the fact the government's probably not got enough understanding of what business needs, what we need to invest in in terms of technology and skills and all the rest of it, and business just feels very antagonistic towards government, they don't like government, they just worry about taxes and they don't think government's going to play any role.

So, I think both sides need to change their attitudes there.

MR. IP: Gardner?

MR. CARRICK: I would say the attitude -- or one attitude that I would look at is the individual. Bruce mentioned earlier that we don't make anything in this country, right? Well, that permeated a lot of individuals and it became -- there was no respect for or desire to make something, because we didn't make anything, so what did it matter?

Now, if you can reestablish a respect for making things, then that goes a long way to establishing an overall respect for manufacturing, so that would be my attitude change.

MR. IP: Thank you, Gardner, thank you, Bruce, thank you, Martin. It's been a very interesting discussion. Thank you, James and Katy, for great material.

(Applause)

MS. GEORGE: (off mic) former CEO of the Timken Company, which is a fascinating company. It's a family company well over 100 years old, core business in roller bearings, headquartered in Canton, Ohio, where they are growing their manufacturing employment, but also growing manufacturing employment in many other places around the world.

In Jim's ten years as president and CEO, he has led Timken through a remarkable transformation, really responding to all of the different trends that we've talked about today.

So, Jim, thank you for being here. We've been all talking about the story of global manufacturing, you've been living it on the frontline and thriving, and we look

forward to hearing your story.

MR. GRIFFITH: Thanks, Katy. You may be wondering what I wondered when McKinsey asked me if I would talk at this, what does an industrial products company from Canton, Ohio have to do with a great study from McKinsey and the Brookings Institute? The answer to that question is, the experience we've had over the last 20 years, I think, validates and reinforces the conclusion that is set out in this, and I'd like to just take a few minutes and I'll share with you that story.

If you start --

SPEAKER: Wait until we get that on the screen.

MR. GRIFFITH: Oh, we're not up? Do I need to do something technologically to bring it up?

SPEAKER: They're going to do something back there.

MR. GRIFFITH: Well, let me talk. At this point, the slides are less important than they will be in a moment.

Timken is an industrial company. We were founded 113 years ago by a guy who invented the tapered roller bearing and we've grown into a multi-product, multi-technology, industrial products company. When people think of bearings, they usually think of either roller skates that their kids have or cars and the wheels in cars.

In fact, Timken makes products that propel the Mars Rover, we make products that are at the bottom of the deepest oil well, we make products that result in the lights coming on in Beijing everyday, and that is the business that we're in, $5 billion, around the world, and operate 20,000 people in some 30 countries.

And, in fact, if you look through the 20th century, we were part of the developing of the industrial economy. I've actually done a separate talk where I compared us -- called us the Intel of the mechanical revolution, to the point that we had Timken Inside developed in 1930 long before Intel ever thought of Intel Inside.

This slide is probably the critical one to the presentation because it captures the story of Timken and how we've wrestled with the issues that James and

Katy laid out in their report.

This is a graph of return of invested capital over a 50-year period, and if you look at it and you look at it in phases, you see, this is the first piece, if you can't see the bottom, is prior to 1980, you can see what happens from a strong industrial company that innovated over 80 years, high returns, high teens returns over a consistent period over of time, consistent profitability over that period of time.

Then you can see what happened when the world globalized, and in fact, that little peak in 1984 was when I came from Stanford to Ohio and chose to go into manufacturing at that point.

And during that period of time, we were driving to, I'll say, catch up. We were adopting the best practices from around the world. We actually built a new steel mill to improve the quality of the raw material to our product, and you can see the impact of that because, as we got to world scale of operational performance, in fact, we got back to the kind of performance that you would hope to in a great industrial company.

Unfortunately, when the inflection point is, the economic crisis in Asia of the 1997, 1998, suddenly with revenue flat, we saw our profitability plummet and, in fact, our stock went from $42 to $14 in about a 15-month period of time, and that caused us to really step back and reflect on what it took to compete as a manufacturing company, and launched the transformation of the company that, I think, reflects the McKinsey results.

The essence of the company, in 1999, was, we were the world leader in making tapered roller bearings and alloy steel. We made things. We were a manufacturer's manufacturer, and that was the essence of the weakness of the company, is we thought making things was important.

What we recognized was we're in existence only to create value for customers, therefore, it was what we knew that was more important than what we made, and so we went to the market and we re-segmented the company, not around products, but around markets and said, how do we take our knowledge to your market and create new value? And in that period of time, we've doubled the revenues of the company,

we've grown 500 percent in the industrial after market, 400 percent in emerging markets, 250 percent in the energy industry, and we've dropped our automotive participation from being 50 percent of the company to being less than 20 percent of the company.

So, a radical market portfolio change, which then drove a radical product portfolio change. Again, in 1999, we made tapered roller bearings and alloy steel. Today we have more than 20 product lines. We make things from gear boxes that are as big as this room that drive a big military ship, to the military economy, to small instrument bearings that area a millimeter in diameter, to, we have a steel mill -- million ton a year, specialty steel mill, that has 30 percent of what it sold last year didn't exist five years ago.

So, a radical product innovation, and, in fact, the nice way to talk about that is $40 million of the output of that steel mill in Canton, Ohio was exported to China last year, and, in fact, that mill is going through a $300 million reinvestment right now, hence the comment about job growth in Canton, Ohio.

And that translates to geographies. We recognized that the world is flat, Tom Friedman, and that the opportunities around the world were going to be very different, and so we began to focus on emerging markets where the infrastructure was being put in place. In that period of time, our employment in Asia went from 1,000 people to over 5,000 people, our revenue in emerging markets grew 4.5 fold over that period of time, and it created a different face of the company as we go around the world, because if you're a knowledge company and you're going to be global, you're going to have a very different workforce, and again, a way to capture that, we privatized a communist factory in Ploieşti, Romania that made high tech industrial bearings. We discovered in the back of the factory was an engineering department that was among the best in the world, underemployed engineers, and that is, today, our global center of design for large industrial products, whether installing it in Gary, Indiana or Kunming, China, the product is designed at that facility in Romania.

And then, all across that was a re-commitment to performance, a commitment that said, if you're going to succeed in the world, you've got to be the best in

the world, and if you're going to be the best in the world, then you've got to understand what factors of performance have to be the best in the world and committed ourselves to get there.

So, 85 percent reduction in accidents across the world, a dramatic improvement in customer service across the world, a $250 million investment in an ERP-based rethinking of the supply chain systems of the company. And the bottom line, if you look at the right hand side, is a dramatic rebound in profitability to the point that in 2011, two years after the great recession, we were at record profitability, 2012, assuming nothing falls off the rails in the next two months, will be our second best year in our history, again, despite a global economic slowdown.

And, in fact, as we tested that, we went back and created a peer group of industrials -- the top 40 industrial companies in the S&P 400. The light blue in this graph is the median performance, the dark blue is top quartile, and so if you look at -- when we improved ourselves in 1998, we got ourselves all the way up to average, which we were feeling pretty good about it, but if you look at it in perspective, we got ourselves all the way up to average. In comparison, 2011 was not only top quartile, it was top decile, and it is a factor of recognizing we operate in a global economy.

Now, let me translate that in terms of what I would call some takeaways, both for manufacturers and then I'll do the same thing for policymakers.

Message number one: Jim Collins in his book *Good to Great* said, "It's all about having the right people on the bus," and at all levels of the company, at the top part of the company all the way down to the guys running the machines, you've got to have the best people in the world. Competition among companies, competition among countries, is all about having the best people and investing in those people and creating that knowledge that you take to market.

Secondly, and this is one that I think gets controversial when you talk about Steve Jobs and making iPads. Manufacturing companies exist because they make the world a better place, and if you can't measure that value, you won't succeed, because

you get caught up in counting the number of widgets you make as opposed to counting the profitability that you achieve for your customers, which then gives you a right to exist and to be profitable.

Again, just, Tom Friedman coined this comment, “the world is flat”, and he did it in a very populist way. I can remember one of my guys jumped out of sick bed when he read in Tom Friedman’s book, “Why would you make anything in Canton, Ohio that you can make in Canton, China?” I actually validated, Tom’s never been to Canton, Ohio, but, you know, when you stop and you think about that, as a manufacturer, that is fundamental. You’ve got to accept that the world is flat. We live in a global world.

And I think the McKinsey report does a great job of providing a guide to where you should do what in the world, and if something needs to be made close to raw material, you better be there. If something needs to be made with low cost labor, you better be there. If something needs to be made close to the market, you better be there, because if you don’t, somebody else is, and you know the story of the lion and the antelope. The antelope gets up in the morning thinking he’s got to be faster than the fastest lion. The lion’s got to get up in the morning and he says, I’ve got to be faster than the slowest antelope, otherwise, one becomes dinner and the other one starves.

Well, the reality is, and I think Katy showed it in her graph of Caterpillar versus the Chinese equipment manufacturer, there is somebody out there gunning for you and if you don’t make those decisions -- if we don’t make those decisions, then we will be history, and that’s fundamental for everyone to understand that you’ve got to make those decisions and drive to success because what we do is important.

And, again, I think the McKinsey report captured a lot of the value around manufacturing. It’s not just jobs. It is R&D, it is the development high skill workforces that drive universities, and that builds the wealth of the country, but as I shared with Katy before, I’ve got a little deeper sense of that.

From my sense, America sent two armies overseas in the 1990s, one went to the Middle East to deal with dysfunctional governments and fought, you know, a

fabulous cause. The other one went to China and India, and they did their own quiet conversion for global development and global peace, and the fact that the lady I hired in China as our first employee in 1996 is today supporting her daughter, who's a junior at Washington University in St. Louis, I think, says it all about the relationship that has been built on the back of manufacturing, global trade, which I believe is a foundation to a stable global political structure.

Now, let me turn around and be a little more risky and talk to the policymakers. Again, a strong manufacturing sector is vital to America. I mean, I think that is just really a powerful message to takeaway. And, again, the McKinsey report captures a lot of the statistics around it.

I'd just add to that, to the policymakers, you know, we're in this together. So often in the heat of the political race, the manufacturers who are investing in Asia and that sort of thing are criticized, are held up for ridicule as being the enemy. You know, we're in this together. We're all Americans and we're trying to build a great country and trying to build the strength of our businesses at the same time.

But the reality is, the world is flat, and, you know, the quote that came out in the political rhetoric, I actually heard it from the Secretary of Commerce here about four weeks ago that we have to get rid of this tax credit for shipping jobs overseas, which again is, from my point of view, populist pabulum. It is -- we've got to get underneath it and understand, what does it take for manufacturing companies in America to be successful and build the infrastructure around that?

And, again, I'll share with you just quick takeaway. In the last ten years, Timkens built six plants in Asia, across India and China, because we've been growing there. We've gone from employing 1,000 people to over 5,000 people. It's now a quarter of our workforce, and so that sounds like I'm the king of off-shorers in mechanical products. But at the same time, we've grown our exports from the United States to $660 million last year, which accounts for a quarter of our employment in North America, because we've learned how to be successful on a global stage, and American workers

can be successful on a global stage if, in fact, we make those investments and we make them effectively.

So, from policymaker's point of view, and I think the comment was made, you have to create a level playing field, but I chose a different word here. You have to demand a level playing field, because this is not just what we do in America, this is the rules that we set with our fellow countries on how we compete, for manufacturers things like anti-dumping, intellectual property, the ability -- the aforementioned discussion on visas -- those are important from other countries to allow us to compete with them.

But at the same time we have to look at our own world and we have to create the environment for success.

I think Gardner said it very, very, very well. This isn't about picking winners, it's about creating the ecosystem that allows us to win or lose, and therefore, you know, I believe in America and I believe if you create that ecosystem, that we can be successful, and that ecosystem doesn't include a regulatory structure that the National Association of Manufacturers says puts a 20 percent headwind at us, the highest tax rate in the world, I mean, there's a lot of those issues that we've got to work through together if, in fact, we're going to continue to have the strongest manufacturing sector in the world.

And finally, I'll close simply with an advertisement for what Bruce, I think, was lobbying through the whole presentation, it is all about people. It's about people on an international scale, not just a national scale, and we in America, have won in the 20th century because we built the best educational system in the world to create the people who would win.

As we look to propel that into the 21st century, we've got to make the investments in that, we've got to create the policies that propel the highest skilled people in the world, because without that, we have nothing with which to compete.

So, again, thank you to McKinsey, thank you to Brookings for the opportunity to tell my story, and thank you for a great framework for us to think about the manufacturing challenge.

(Applause)

MR. KATZ: Let me close. First of all, that was a great presentation, Jim. You violated the number one rule at the Brookings Metropolitan program by quoting Tom Friedman, *The World is Flat.* He's right, but the world is also spiky, to quote Richard Florida. So, we have to remember the role of cities and metropolitan areas.

We didn't get that memo out to everyone.

I just want to thank James and Katy, phenomenal work, phenomenal effort.

On January 15th, for those of you who really plan that far ahead, Brookings will be holding a day-long Growth Through Innovation forum, about a week before the inauguration. Martin will be heading up one of the panels. I'll be heading up a panel on recharging American manufacturing. Don Barton, who's the managing director of McKinsey, will be here, Klaus Kleinfeld from Alcoa, Mayor Greg Fischer from Louisville, and some others.

So, what we're hearing today is part of a continued effort at this institution, across multiple programs, to put a focus on manufacturing and innovation and export-oriented growth, and to put the world, in flat, in context.

Thank you very much.

(Applause)

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CERTIFICATE OF NOTARY PUBLIC

I, Carleton J. Anderson, III do hereby certify that the forgoing electronic file when originally transmitted was reduced to text at my direction; that said transcript is a true record of the proceedings therein referenced; that I am neither counsel for, related to, nor employed by any of the parties to the action in which these proceedings were taken; and, furthermore, that I am neither a relative or employee of any attorney or counsel employed by the parties hereto, nor financially or otherwise interested in the outcome of this action.

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