

# REBUILDING AMERICAN MANUFACTURING

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HEARING  
BEFORE THE  
SUBCOMMITTEE ON  
ECONOMIC POLICY  
OF THE  
COMMITTEE ON  
BANKING, HOUSING, AND URBAN AFFAIRS  
UNITED STATES SENATE  
ONE HUNDRED THIRTEENTH CONGRESS

FIRST SESSION

ON

EXAMINING THE ROLE THAT U.S. MANUFACTURING PLAYS IN THE  
ECONOMY, ECONOMIC GROWTH, AND EMPLOYMENT; ALSO HOW “IN-  
DUSTRIAL COMMONS”, SUCH AS CLUSTERS, SUPPLY CHAINS, AND  
PUBLIC-PRIVATE PARTNERSHIPS, AFFECT U.S. MANUFACTURING

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DECEMBER 11, 2013

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WEDNESDAY, DECEMBER 11, 2013

U.S. SENATE,  
SUBCOMMITTEE ON ECONOMIC POLICY,  
COMMITTEE ON BANKING, HOUSING, AND URBAN AFFAIRS,  
*Washington, DC.*

The Subcommittee met at 3:38 p.m., in room SD-538, Dirksen Senate Office Building, Hon. Jeff Merkley, Chairman of the Subcommittee, presiding.

## OPENING STATEMENT OF CHAIRMAN JEFF MERKLEY

Chairman MERKLEY. I call this hearing to order. Thank you all very much for your patience. We are starting a few minutes late, and I hope we will have plenty of time to explore this important topic of manufacturing.

When I became Chair of this Subcommittee, I knew that I wanted to spend as much time as possible to focus on manufacturing because if we do not make things in America, we are not going to have a middle class in America. Manufacturing is the heart of an economy that provides good living-wage jobs to working families.

Growing up, I experienced firsthand the power of the manufacturing economy. My father worked as a millwright at a saw mill. We were never rich, but on a single working man's salary, it was possible to own a home, have food on the table, and for my parents to save a little bit to help send the children to college. So these jobs, these manufacturing jobs, can make all the difference between a firm financial foundation for a family and the absence of one.

Unfortunately, over the last couple of decades, jobs like these have been disappearing from our Nation's shores. According to the Bureau of Labor Statistics, in the 12 years between 1998 and 2010, the United States lost more than 5 million manufacturing jobs. Similarly, between 2001 and 2012, we lost more than 50,000 factories. This crisis in manufacturing is a huge challenge and must be addressed if we are to sustain a thriving middle class.

The good news is we have recently made some progress toward reversing this trend. Since the end of the Great Recession in 2009, our economy has added back more than half a million manufacturing jobs. In my home State of Oregon, we have seen headlines like, and I quote: "Manufacturing leads job gains in Clackamas County."

But I note from the discussions I have had with manufacturers around the State, both during my Made in Oregon tour in 2012 and in my day-to-day work, that there are a lot of positives to be seen in Oregon and America regarding manufacturing right now. But

there are many challenges. Are we developing the robust research and development and supply chain infrastructure so necessary to today's world of high-tech manufacturing? How do we make sure our middle and high schoolers are being exposed to manufacturing careers and hands-on education in an era of shrinking budgets and fewer electives? And how do we make sure our workers are prepared not just for traditional manufacturing jobs but for the growing world of high-tech manufacturing?

Do our manufacturers have sufficient access to capital that is needed for long-term growth? And how does the U.S. compete with other countries that may have lower labor or environmental standards without entering a race to the bottom? How do we make sure that we have enforcement action when other countries provide massive subsidies to State-backed industries?

These are just a few of the questions I hope we explore today. There is no doubt that we have a lot of work to do once again to see a thriving manufacturing sector. There is also no doubt that we stand to gain a huge payoff for our economy and our middle class if we do so.

With that, I will turn to Senator Heller for his opening statement.

#### **STATEMENT OF SENATOR DEAN HELLER**

Senator HELLER. Mr. Chairman, thank you, and thanks for holding this hearing. I am pleased that our Subcommittee continues to focus on jobs in the middle class. I want to thank those of you here with us on the panel. Being here today does make a difference, so thank you very much for taking your time to spend that time with us.

For too long, job creation has received second-class treatment by Congress. With Nevada continuing to lead the Nation in unemployment, Congress must develop policies that spur job growth, especially in industries like manufacturing. Manufacturing is critical to the American economy. Its continued strength is key to putting Americans back to work. While Washington hesitates to act, America's manufacturers are shutting down and jobs are being lost.

While Nevada is known for traveling, gaming, and mining, manufacturing represents an important segment of our economy by employing more than 56,000 workers at 1,800 manufacturing companies. I would also note that the average wage for manufacturing employees in Nevada is \$52,000 a year, which is \$10,000 more than the average salary in the State. Unfortunately, Nevada's manufacturers are continuing to struggle in this recession. Just a few months ago, a headline in my hometown newspaper read, "Manufacturing sector's rebound likely is not near." The article went on to highlight that Nevada has lost 10,000 manufacturing jobs during the recession and has only regained 1,000. By industry sector, that is the second largest job loss in the State.

While it cannot be done overnight, it is my hope that Washington can get serious and implement an agenda to strengthen American manufacturing and create American jobs. I believe that the key to ensuring Americans continue to have access to high-quality manufacturing jobs is not to enact burdensome regulations or a protectionist agenda but to expand economic freedom. This goal can be

accomplished by simplifying our Tax Code so that businesses are encouraged to locate and remain in the United States by ensuring that we are effectively educating our children and by supporting policies that foster fair competition and open access.

As a Nation, we are encouraged by realities of this growing global and technological economy, and Congress must develop policies that ensure that the U.S. remains at the forefront of these dynamic changes and create jobs here in America.

Thank you, Mr. Chairman. I look forward to the testimony from our witnesses.

Chairman MERKLEY. With that, I am going to introduce the witnesses. I have already asked Senator Warren if she would like to make an opening statement. She said no, let us jump right in, so we will do so. I am so delighted to have all of you and your contribution and your expertise to address these issues.

Suzanne Berger is the Raphael Dorman–Helen Starbuck Professor of Political Science at the Massachusetts Institute of Technology. She cochairs the MIT Production in the Innovation Economy Commission, otherwise known, I think, as the PIE Commission, a 20-member faculty group that studies innovation in manufacturing in industrial countries. The reports of the PIE Commission have just been published in “Making in America: From Innovation to Market” and “Production in the Innovation Economy”, both in 2013. Professor Berger is also author of “How We Compete: What Companies Around the World Are Doing To Make It in Today’s Global Economy”, and other books and articles on the political economy. She served as the head of the Department of Political Science and director of the MIT International Science and Technology Initiatives. She is a member of the American Academy of Arts and Sciences and received the Legion d’Honneur.

Leo Hindery is chair of the U.S. Economy/Smart Globalization Initiative at the New America Foundation, cochair of the independent Task Force on Jobs Creation, founder of Jobs First 2012, and a member of the Council on Foreign Relations. He is the former CEO of AT&T Broadband and its predecessors Tele-Communications, Inc., and Liberty Media, and is currently an investor in media companies. Thank you, Leo, for coming from New York, and thank you, Suzanne, for coming from Boston.

Derek Scissors is a resident scholar at the American Enterprise Institute, AEI, where he studies Asian economic issues and trends. In particular, he focuses on the Chinese and Indian economies and U.S. economic relations with China and India. He is also an adjunct professor at George Washington University where he teaches a course in the Chinese economy. Before joining AEI, Mr. Scissors was a senior research fellow in the Asian Studies Center at the Heritage Foundation. He also worked in London for Intelligence Research, Ltd., taught economics at Lingnan University in Hong Kong, and served as an action officer in international economics and energy for the U.S. Department of Defense. He has a bachelor’s degree in economics from the University of Michigan, a master’s degree in economics from the University of Chicago, and a doctorate in international political economy from Stanford University. You did not have as far to come, but we really do appreciate

you making it through this big snowstorm that we are experiencing here in D.C.

Julie Skirvin is general counsel of Oregon Iron Works, the parent company of United Streetcar. Her experience at the company also includes leading the business development team at United Streetcar. She is also on the board of Drive Oregon, an entity that supports the growth of the electric vehicle and the electric mobility in Oregon. Early in her law career, she was deputy district attorney for Multnomah County in Portland. She is a graduate of Willamette University College of Law and Oregon State University. Julie, thank you very much for coming and for filling in for Bob Beal, the CEO of Oregon Iron Works, who was not able to be with us.

Before we proceed, I would like to extend my appreciation to the UC–Hastings Law Professor Joel Paul and Ryan Costello of Click Bond, Inc., from Nevada, who prepared testimony for the hearing, but the hearing was canceled due to the Government shutdown, so we lost a couple folks along the way. They were not able to join us this time, but I will ask that their testimony be entered into the record, and the Chairman will do so since there is no objections.

Chairman MERKLEY. We will keep the record open for 7 days for witnesses and Members to submit additional materials as well as for questions for the record, which we would kindly ask that our witnesses respond to as promptly as possible.

With that, we now turn to our testimony. Dr. Berger.

**STATEMENT OF SUZANNE BERGER, RAPHAEL DORMAN-HELEN STARBUCK PROFESSOR OF POLITICAL SCIENCE, AND COCHAIR, MIT PRODUCTION IN THE INNOVATION ECONOMY COMMISSION, MASSACHUSETTS INSTITUTE OF TECHNOLOGY**

Ms. BERGER. Senator Merkley, Senator Heller, Senator Warren, I am very honored to have been invited to talk about a 2-year study that we have just conducted at MIT, and we asked basically one question. What kinds of manufacturing do we need in the United States in order to get full value out of our innovation?

We know that innovation is strong in the United States, and our question is: How do we get the benefit of that innovation in the form of economic growth, in the form of good jobs for American workers, in the form of new companies and enhanced profits for our existing companies?

We look at new companies that have been created over the last 25 years, a company like Apple where Apple and other companies like it specialize in R&D, design, and distribution, but have no production at all, no production in the United States, and no production within the four walls of their own company, and yet they still earn the lion's share of the profits from products like iPad and iPhone. And the question is: Could we all do Apple? Is this the model for the future of the American economy? Do we really need manufacturing at all in order to get the benefits of innovation?

And this is the question we started with, and the way in which we conducted the study was through surveys of manufacturing establishments, through studies of startup companies in the United States, through studies of Main Street manufacturers, and by going and interviewing in Fortune 500 companies in the United States.

And the question we asked in each one of them was: When you have an innovation, a new idea, whether it comes from an R&D lab or it comes from the shop floor, how do you get it to market? How do you get it into the hands of a customer? Where do you find the skilled workers? Where do you find the capital? Where do you find the suppliers, the facilities, the additional technical expertise that you need?

And I think the bottom line of all of this research—and we did talk to about 260 companies in the course of it, not only in the United States but also in China and Germany. The bottom line is that while we are great on innovation, there are real problems about scale-up. And the problems about scale-up have to do with missing inputs. We find real problems in capital markets. We find real problems in the skills and the formation of the new skills that the most advanced manufacturing companies need. We see a variety of ways in which holes have opened up in the industrial ecosystem.

And it is the comparisons that we have been able to draw between, let us say, a Main Street manufacturer in Ohio and a comparable mid-sized German company that really point to these holes in the ecosystem, the market failures that really are blocking scale-up of our own innovation.

A Main Street manufacturer, when he has a great idea in Ohio, has a problem. There are no longer any local bankers in the United States, as you know, whereas the German manufacturer still has local and regional banking. There are real problems about who is training the workforce. There are real problems about suppliers. And if we look at the origin of all these problems, we think that it really dates back to the 1980s at a time in which financial markets put real pressure on manufacturing companies to become more asset light, and that meant getting rid of plants, getting rid of workforces, and all that was reflected in improvements in stock prices very rapidly.

The reason that these enormous changes in corporate structure matter is today we have a much more fragmented industrial system. Think about DuPont when it invented nylon in the 1930s and 1940s. It had the plants to move that production into. It had no problem about capital markets. It had cash. It was able to retrain its own workforce because it knew those workers would be there for lifelong careers. And in every one of these dimensions, the industrial system has changed in the United States.

So, in conclusion, I would say we believe that we are at the moment of great opportunity, a new window for American manufacturing. We have lower energy prices. We have a lot more realism about the real costs of outsourcing and offshoring. But if we are really going to consolidate this advantage and make this a real opportunity, we really need to think about how to bridge these gaps in the ecosystem, and that is going to require new private–public partnerships that we begin only now to see emerging.

Thank you.

Chairman MERKLEY. Thank you very much, Dr. Berger.  
And we now turn to Mr. Hindery. Thank you.

**STATEMENT OF LEO HINDERY, JR., CHAIRMAN, SMART  
GLOBALIZATION INITIATIVE, NEW AMERICA FOUNDATION**

Mr. HINDERY. Thank you, Senator. Just as like coals to Newcastle, your own enthusiasm for this sector is what guides the four of us.

One of the challenges I think we have had in this country since about 1980 is we have failed to appropriately size the sector. We speak with passion about the sector, but we do not size it. Right now, as you know, we have about 8 percent of women and men in the civilian labor force in manufacturing, and work we have done suggests that this figure needs to be closer to 20 percent. With an objective in mind, I think it is easier to contemplate remedial policies.

The other thing that has mired us down is the absence, the fundamental absence, of a national manufacturing policy. Nineteen of the G20 Nations have a very precise, very articulated manufacturing policy that coordinates the policies of their Federal-type Governments. We alone uniquely do not have such a national policy.

We also, as Dr. Berger has mentioned, have put ourselves at what is called the SME level, the mid-sized level, in a capital drought. We hear often that the lack of capital to grow is the biggest challenge for the so-called feeder manufacturers for the large-scale manufacturers. It is certainly my hope that the Dodd-Frank rules will reopen the banking community to lending to the mid-sized manufacturers. But in the interim, it would help to see a program similar to the Small Business Credit Initiative that we passed in 2002 as part of the Small Business Jobs Act. Another initiative of this sort would be incredibly helpful right now.

The other thing that would be helpful—and, Senator Warren, something that you have commented on, I know, a number of times is far greater use of public development banks. Twenty-five percent of the world's loans now come from this category of lending, and 30 percent of the loans made within the entire European Union. We also do not use our Export-Import Bank relatively as much as do the other G20 Nations.

Of the other potential solutions, the one that comes to mind most immediately for me is a National Infrastructure Bank, and in my written comments we offer solutions that we spent a great deal of time on as to how such a Bank might be developed, Senators, that would primarily employ the fiduciary capital of the States and our larger municipalities in ways that the Federal Government's involvement would be scored at zero vis-a-vis the Federal deficit. Specifics of that are found, again, in my written comments.

The significant challenge that confronts us if we do not have our own National Infrastructure Bank is that with the need for infrastructure redevelopment being so high, we will soon see otherwise foreign monies coming in to resuscitate our vital seaports, roads, and airports. It is imperative, in my opinion, that an American Infrastructure Bank be part of the agenda of today's hearing.

I certainly, Senator Merkley, agree, as does Dr. Berger, about the need of helping students transition into manufacturing-related careers. I am of an age personally that saw a pathway readily available to me as a student, but this is no longer the case today. Many

countries, as we know, use the promise of free training and education in this category to achieve the positive employment outcomes that Dr. Berger spoke about.

Finally, I must talk about the need for fundamental reform of our major trading relationships, and I mean all of our trading relationships. The imbalances that have occurred represent a panoply of challenges confronting us, and Dr. Scissors speaks to them better even than I do. But just our trade deficit with China alone costs us about \$40 billion in lost wages each year.

I am of a mind that the fundamental challenge confronting us in trade now is even greater than the challenge confronting us in our Federal deficit. We know that China and other countries in Asia especially now use unfairly gained trade advantages, and we are seeing them show up suddenly in places like Brazil and Bangladesh. And, Chairman Merkley, as you have endorsed, it should be easy to include the cost of these subsidies, these back-door advantages, in our antidumping duty calculations. But getting our trading relationship with China right is an imperative and where we need to start because it is now a model being adopted by other developing Nations, all to the detriment of the U.S. manufacturing sector.

Let me just finish by saying that it is important, Senators, that we speak about the net export position of this country. The Administration, in my opinion, has spent way too much time talking about gross exports when net exports are what really matter.

We certainly should, if we encounter it, call out currency manipulators. China continues to be one, in my opinion. There are serious questions continuing about China's Indigenous Innovation Act, probably the most protectionist act we have seen of its sort ever. And I am gravely concerned, as a closing comment, about the pending Trans-Pacific Partnership. The free trade negotiations there I think are intellectually and economically flawed in trying to treat these countries as "one-size-fits-all."

A real pleasure. Thanks, Senators.

Chairman MERKLEY. Thank you.

Dr. Scissors.

**STATEMENT OF DEREK SCISSORS, RESIDENT SCHOLAR,  
AMERICAN ENTERPRISE INSTITUTE**

Mr. SCISSORS. Thank you, Mr. Chairman, and thank you for your kind introduction. As you indicated, I will be speaking from the global perspective, and the first thing that you see from the global perspective is that the global perspective and, hence, my testimony do not matter very much.

Notwithstanding that I just shot myself in the foot, that needs to be said. If you measure the size of an economy by aggregate wealth rather than gross domestic product—because gross domestic product is a terrible measure of everything—you get the United States at about \$70 trillion, and you get China and Japan under \$25 trillion each. That estimate is imprecise. Nonetheless, the advantage that we have is about \$40 trillion or more.

I do not mean to say that that means everything is fine. What I mean to say is that means what we do here matters much more than what everyone else does. And even though I am going to focus

on what everyone else does, I think that is something that we need to remember, that our actions matter more than everyone else's actions, not only because it is our country but because we are much bigger than everybody else.

Now, the international perspective to me offers two major observations, one of which I will pursue in detail, one of which I will not. The one that I will not, I will just make from the outset, is I worry about American monetary policy. I agree with my colleagues that we do not have excess credit in manufacturing for small and medium manufacturers. That is not what I mean. I mean that we have a pattern that we see overseas in Japan and in China where long periods of very loose monetary policy kills corporate competitiveness, because getting access to money is no longer about how good your project is, no longer about how good your companies is. It is just, hey, there is all this money floating around, who are the people I know?

So we are not at that point yet, but we have seen in our major manufacturing competitors loose money has hurt them in the long term—not 2 years of loose money, not 3 years of loose money, but a long period of loose money. And I would like that to be considered in our domestic policy as well as the macroeconomic effects which are considered on a more routine basis.

The second major observation I want to make is that competition is the lifeblood of prosperity. Taking away competition in this country is never going to benefit us. It will only benefit a few. It will not benefit the whole. That also applies to overseas markets. The more competition we have in overseas markets, the better for everyone, including the United States.

There is, if we are looking overseas—which, again, is secondary to being at home—the single biggest problem in competition that I identify would be Chinese subsidies. By subsidies, I do not just mean money. We normally think of subsidies as somebody handing over money to someone else. And I do not think the United States should think of it that way either—either at home or overseas. The biggest subsidy that you can have, violating that competition requirement that I spoke of, is pervasive in China. It is regulatory protection from competition. That is, China seals off major sectors from competition and reserves them for its State-owned enterprises: coal, oil, shipping, steel. There are a dozen more.

Once you do that, once you say that State-owned enterprises must dominate these areas, everything else is a detail. Wages, land—it does not matter. You have ensured that your companies cannot go bankrupt and foreign companies can only succeed to the point that you allow them. So to me, that is something to think about around the world—protection from competition.

There is, of course, also financial transfers that occur in China and elsewhere through the banking sector, but the protection from competition is the most fundamental problem that we face overseas, particularly in China.

Now, let me also say what some of the impacts on the U.S. are. We tend to focus on imports. It is true that the Chinese subsidize their exports in various ways, and that creates an unlevel playing field. It is also true that our consumers benefit from those subsidies. Where nobody in the U.S. benefits and nobody overseas ben-

efits is when China closes its own market. So that I would prefer to focus on U.S. exports to China, notwithstanding Leo's comments, because there is no benefit to the U.S. for Chinese subsidies in their home market; there is no benefit for them blocking competition; there is no benefit from U.S. goods and services being kept out at all.

In addition, we have a third problem, which is competition in third markets. The Chinese presence in global markets has become much larger. I have a data set that tracks Chinese outward investment. You can see all the transactions if you want to see what they are doing, and what that means is, as Leo hinted, the Chinese are exporting their model. And when you do not have any protection in your home market—sorry, any competition in your home market, that gives you a big advantage in other markets. That is a disadvantage. American firms have to compete here. Chinese firms do not have to compete at home. They have better access to revenue; they have better access to customers. So I would focus on the impact on the U.S., the blocking of the Chinese market, and the growing problem of competition in third markets.

There is not much time here. I am going to give an extremely boring recommendation which completes the circle of me saying my testimony is not that important, so it is unimportant and boring. That is a great one-two punch. I think I might be ready for the Congress. Sorry. I had to make that comment.

We need to start measuring Chinese subsidies. We talk again and again and again about how the Chinese are unfair traders, and I agree with that talk in a number of respects. But we do not actually document it. We just assert it. We cannot negotiate with them. We cannot go to the WTO. We cannot take well-informed, unilateral action unless we actually know what they are doing. And that applies, of course, to China because they are the biggest violator here. But they are not the only one. Far from it.

So in stressing that theme of violating competition and looking overseas and saying our access to foreign markets is being blocked hurts the country, we need to document that. And it is dull. It is not an exciting new program to announce. But it is what is going to enable us to take all those corrective steps that we need to take.

Thank you.

Chairman MERKLEY. Thank you very much, Doctor. And your self-evaluation may not be shared by all of us, because I found it very interesting and many questions to pursue there. Thank you.

And I am so delighted to have an individual from Oregon come join us who is involved in manufacturing on the ground and may have some real-life experiences to share in this context.

#### **STATEMENT OF JULIE SKIRVIN, GENERAL COUNSEL, OREGON IRON WORKS**

Ms. SKIRVIN. Thank you, Mr. Chairman and Members of the Committee, for having this opportunity to address this hearing today on a topic that is so important to Oregon Iron Works and United Streetcar and other manufacturers across the country. And it is nice to have a home State Senator here in the room this afternoon.

What some of you may not know is that I represent United Streetcar, who is the first manufacturer of modern streetcars in more than 60 years manufactured in America.

Oregon Iron Works is a diverse company. We fabricate demanding hydroelectric, bridge, and civil construction trades applying modern manufacturing techniques. We fabricate space launch complexes, missile defense systems, the silos that support and defend this country against attack, marine craft for the Navy and our Special Forces, nuclear containment casks for storage of spent fuel, and our newest venture the manufacturing of modern American made streetcars. United Streetcar was organized in 2005, and I am pleased to share today that we are completing a streetcar every 6 weeks. We have delivered seven streetcars this year to the city of Portland and the city of Tucson, and our next delivery will be in the amazing town of Washington, DC. We are working with DDOT currently to coordinate the delivery of the first car.

This new company has created a hundred jobs in the Clackamas area in a difficult recession time. Those are family wage jobs with good benefits. In creating a new supply chain, we have sourced over 350 parts and equipment for suppliers across 32 States and including 140 in Oregon. You can imagine the challenge and work required to create a new supply chain for an industry that has been absent from the U.S. for more than 60 years. We are pleased to be a part of the recovery of manufacturing jobs in the United States. Since August, 66,000 jobs in manufacturing have been added to the U.S. economy. Since 2010, 700 manufacturing jobs have returned to Clackamas, Oregon.

One of the key components and challenges that we face is ensuring a supply of skilled workers. Many young people entering the workforce now are unskilled, and they are not ready to work. Those skilled workers need access to training, and the public education system should place more emphasis on technical training in high schools. There are some examples of stellar programs in our area. We work with Benson High School, Portland Community College, and Clackamas Academy for Industrial Sciences. But these are too few, and too many schools and public officials downplay the important role that technical career paths and technical training can take and support our U.S. economy. What we need is the necessary funding and the respect that those programs deserve.

Another important area in education is public and private partnerships, similar to what my colleague indicated in her written testimony. We are currently working with Clackamas Community College and the Workforce Investment Council in Clackamas County to identify new hires that have aptitudes in these areas and also to identify and train our newly hired skilled workers to enhance their skills and our workforce.

We applaud the Manufacturing Jobs for America Initiative, which you, Chairman, helped to lead, that focuses on workforce training because that is an essential step in developing the source in the technical arena.

Access to capital is a critical component of rebuilding American manufacturing. In forming United Streetcar, our owners invested more than \$10 million of private money into our facilities, equipment, test track, the overhead catenary providing power for the

streetcars, and our maintenance facility. But not all small businesses have access to capital to expand into new markets and to grow. So to increase the small businesses' and manufacturers' ability to have access to capital is critical.

Finally, investment in America's infrastructure is critical to rebuilding American manufacturing. Investment in basic infrastructure in this country is necessary through reauthorization of MAP-21, finishing the fine work on WRDA, and fully funding the trust fund.

Infrastructure projects support middle-class jobs through manufacturing. Families across the country rely on those jobs for their livelihood.

I want to thank you very much for the opportunity to speak here today, and I would welcome any questions that you have.

Chairman MERKLEY. Well, thank you very much. So we will enter a period of questions. We will take 5 minutes back and forth. I know Senator Warren is going to try to rejoin us.

But I want to start out, Dr. Berger, with your insights regarding Apple. You said that the project was first motivated by looking at Apple basically not having any internal infrastructure for making anything, so they are doing their R&D, and then they are contracting out. And I think you called it "whether the Apple for all was the appropriate model." But I believe that was much—and correct me if I am wrong, but that was largely Apple's model before they decided to move much of their manufacturing or all their manufacturing to China, that they still outsourced their production. And so what really was the reason that they said, "You know what? Let us move it to China"? Was it the issues that we faced domestically in regard to access to capital and trained workers and supportive infrastructure? Or was it the inducements from abroad and China's famous brand strategy and all that goes with that?

Ms. BERGER. So when I mentioned Apple I was using that as an example of the most successful of the new big companies that have emerged in the United States over the last 30 years. There are also companies like Cisco, Qualcomm, and others that have the same model of focusing on the R&D design and distribution part of the function and having production take place somewhere else and most often in somebody else's factories.

With respect to the specific decisions of Apple, as you know, Apple is a very secretive company, and so we did not have access to knowledge about their own decisions. But, of course, the new products that have made Apple's fortune over the past years are ones that were from the very beginning produced in China, in Shenzhen. And I think that what we are looking at is a model in which initially people believed that labor costs in the United States should really drive their decision. And when I talked before about greater realism in people's understanding of the real costs of outsourcing and offshoring, I think we had a wave of companies that believed that they were going to, by moving their operations out of the United States, significantly reduce their costs. And they have now realized how small a part of the overall cost equation labor costs actually are and how transportation and quality and conformance and responsiveness to changes in your market and your cus-

tomers' desires, how much larger those factors are in the total success picture.

I think finally with respect to Apple and other companies like them, I think it is very unlikely that those jobs will return to the United States, and not because of labor costs. I think it is because the Chinese have gotten really very good at doing things like rapid product introductions. There is now a very rich ecosystem in Shenzhen among the manufacturers producing Apple's products. So I do not think there is a great likelihood that those jobs will come back. I think our hopes have to be that the new jobs that we produce in the United States will actually stick here. And I think that the changes we need to make with respect to the industrial ecosystem are ones that will make companies and workers want to stick here, just as German manufacturers, in fact, remain in Germany for the skills and for the other characteristics of their ecosystem.

Chairman MERKLEY. Mr. Hindery, you indicated you might like to add a little something to that?

Mr. HINDERY. I do. This is an area that Dr. Berger and I differ quite greatly on, Senator, and I would like to comment.

In 2010, the machinists union offered to take every one of the Chinese jobs that manufacture the iPhone and the iPad and move them to the State of Oregon and promised similar quality and similar delivery costs. Ninety percent of the cost differential at the onset—and we know this from work done by Microsoft—between the original Apple goods being manufactured in China and the same goods if manufactured in the U.S. had nothing to do with labor. It was all subsidies. As the Doctor says, or described, Apple is secretive as heck. So Microsoft did the analysis essentially for Silicon Valley and concluded that 90 percent of the differential is illegal subsidies of all sorts—currency, finance, siting, everything. And my concern is if we do, in fact, wish to size this sector and if we do, in fact, conclude that we need a much larger sector on the order of two or three times larger, we will not get there by looking over our shoulders and not trying to recapture the jobs that have left us, in my opinion illegally. Apple and the Machinists Union could have worked an accommodation, I promise you, that would have had every iPad and every iPhone manufactured instead in Clackamas, Oregon, rather than in Shenzhen.

Chairman MERKLEY. Thank you. When I come back, I will follow up on the subsidies part. But I want to turn now to Senator Heller.

Senator HELLER. Thank you. And thanks again, everybody, for taking time.

Leo, do you think our tax structure is competitive?

Mr. HINDERY. Senator, I do not. I think it lacks the proper incentives, and it actually has disincentives built into it. We should have an R&D policy, Senator, that rewards R&D that produces jobs in America. We should as a Congress explore the VAT, the value-added tax, our current absence of which makes us uncompetitive against most of the G20. And the fundamental tax rate for corporate America continues to be too high.

In my written comments, Senator, I lay out a number of things, but the easy answer is that we are not—with our current tax structure—our manufacturing sector's best friend.

Senator HELLER. I noticed that in your written comments. That is why I wanted to bring that up. I think that our corporate tax rates here in this country make us very uncompetitive, and perhaps—and you also speak of tax reform as being essential. Obviously we discuss that here in Washington, DC, but we do nothing about it. But we do spend a lot of time discussing it.

A theme across the board here has to do with a National Infrastructure Bank, and there is movement, introduced by Senator Blunt, Senator Warner, myself, and several others, of trying to leverage about \$10 billion in Federal funds. We believe we could leverage those to about \$300 billion over a period of time.

My State, the State of Nevada, needs about \$10 billion in roads, bridges, and highways. Their budget is about \$7 billion, so you can imagine how far behind they are in infrastructure needs. But what needs are in Nevada, of course, go to Oregon and across this country, and we believe that there is a need for an infrastructure bank.

Could any of you speak on that more or do you have any more insight of the need and the effort? Leo.

Mr. HINDERY. Senator, I would argue that the ultimate size of that Bank needs to be almost \$1 trillion. What cannot happen, at least in my opinion, in this Congress—and, frankly, perhaps in any Congress—is we cannot establish a National Infrastructure Bank in a way that further burdens the Federal deficit of this country. The best community to participate in the National Infrastructure Bank is the fiduciary community, for example, the State of Nevada pension plan, the municipal plan in the city of Las Vegas, and similar plans in Portland and in the State of Oregon. And what we have tried to come up with is a structure where, for roughly a 3-percent real rate of return, the public fiduciary community of the United States could be the primary source of funding for the Bank. And if you thoughtfully, Senator, constructed the soft Federal guarantee at the very bottom, it would be scored at zero; we have done work with the staff to show that it would be scored at zero. You would never actually touch a Federal dollar.

And if for example the Nevada State pension plan opted in and the State of Oregon, Senator, opted out, then a project in the State of Nevada would have a preference over Oregon, or vice versa. So there is an incentive for all 50 States to participate in the bank. But what we cannot do, in my opinion, is persist in this short-term approach of sort of block grants through the Department of Transportation. That is simply not a Bank. It fails in scale, it fails in focus, and it fails in developing—something that we know for the country has to occur.

Senator HELLER. Thanks for your insight.

Dr. Berger, I have another question for you having to do with banks. You mention in your written testimony that local banks are no longer plentiful, and I would agree with that. Nevada has lost about half of its community banks in the last 5 years, and the impact that that has had on small- and medium-sized manufacturers has been big. Big banks lend to big manufacturers, but nobody is lending to the smaller manufacturers. What can we do to help expand some of these community banks and get some competition in there so that they are not devoured? That is what is happening. We are being devoured by the larger banks. And at one time, you

know, we had 100 community banks. We have 50 community banks today, and that has a huge impact on these manufacturers.

Ms. BERGER. So we have noticed this in our research as well, and it was particularly in the comparison between the German manufacturers and the U.S. manufacturers that we were seeing in Ohio, Arizona, Massachusetts, and Georgia, that when the German manufacturers, when we talked to them about how they were able, for example, a machine tool maker who had been working in the auto sector and decided that it would be good to branch out into making machine tools for medical devices or machine tools in solar and wind, the first thing they would do is talk to their local bank. They have local banks, they have regional banks. And that was an enormous factor in their ability to diversify, to take legacy capabilities that they had in their firm, but to scale up in new sectors.

And that is what we just did not see in the companies we were looking at. They had new projects, but all they have are the retained earnings from the previous year's profits, and that is why when you see an innovation in one of these companies, the resources get dripped in slowly, slowly, slowly. It does not move to market quickly, and it does not create many new jobs exactly because of this difficulty of accessing capital.

Senator HELLER. Thank you.

Chairman MERKLEY. So I wanted to return to this core question about—thank you very much, Senator Heller.

Senator HELLER. Thank you.

Chairman MERKLEY. He has a conflict to attend to, so I am going to carry on by myself for a while.

Mr. HINDERY. He is also a slow walker.

[Laughter.]

Chairman MERKLEY. Back when we were having the last round of discussions about trade agreements here in the U.S. Senate, I proposed an amendment that essentially required the U.S. Trade Representative to exercise its power under WTO to do counternotifications. Essentially China was required to do notifications of the subsidies it provides under WTO. It had not done so. And under the WTO agreement, it says that another party can then post counternotification. So within what seemed like a few hours, although it was probably a week, of entering that amendment, our U.S. Trade Representative did publish a list of counternotifications, and on that list were a whole series of items that were essentially famous brand strategies. There were solar and renewable energy strategies, there were paper strategies, and there were famous brand strategies, which goes right to the heart of why I was asking about what moved Apple, because the famous brand strategy was the concept if we can do everything possible to move a famous brand to China, their supply chain will follow, and their competitors will follow. So it may be kind of the loss leader, if you will. And there are many stories about how Apple was courted in terms of early invitations, pre-built factories, and so on and so forth. So that is the piece I wanted to understand a little better.

But you have mentioned, Dr. Scissors, that we need to be able to measure the Chinese subsidies. As you have looked at those—and I know there are many, many different forms of them—could you start maybe by talking about some of those strategies that

were revealed through the counternotifications and maybe also some of the ones that are less formal, like if you do not manufacture here, we will not let you market here in China, or if that is, in fact, an issue?

Mr. SCISSORS. Let me just say I thought your legislation and the ensuing USTR response were a wonderful step forward because subsidies had been ignored, even though they are at the heart of the Chinese economy and the heart of the distortion of our trade relationship with China that had been ignored for years before that. So that was great. And I do not mean this as a criticism of USTR at all. That list is sadly incomplete, and it is incomplete because they feel like they are struggling with an absolutely gigantic problem.

As you noted, the Chinese do not notify properly when they do notify. You kind of look at the list and say, "That is what your notifying us about? Because I have got 10,000 others over here that you have not mentioned." And so the problem on the American side is difficult. It is not something that can be solved in a week.

As I said, with regard to—you were concentrating on famous brands. That naturally attracts attention and for good reason, because as you mentioned, the brands bring along other companies with them. So the Chinese correctly saw that there were industries, textiles, which were already—China was already a part of, but also consumer electronics that have long supply chains and who moves them is the head of the chain, somebody like Apple, somebody like Qualcomm.

Those are important factors. I would not necessarily consider them the most important because they do not distort the entire Chinese economy. That is what is going on there. When you do not allow competition, you have changed the whole nature of the game.

We are in a situation now where American auto firms, for example, are doing very well with their business in China, but it is skewed because their production in China is given advantages over exports from the United States or other places of production, and their production in China is under threat because the Chinese would like to brand the production themselves. They want to say, "Hey, we used to be the minority partner of this famous brand. Now we are the majority partner of this famous brand."

So I think, my—I am taking too long for the answer, but we took a step in the right direction. We have a lot more work to do. The big thing would be to try to quantify what the cost is to American firms and workers of barriers to competition. Famous brands are certainly a part of that. I would not make them the biggest part because they are particular to certain areas and not an economy-wide issue.

Chairman MERKLEY. So if I were to mention some of the different categories—and one is land that is often taken from peasant agriculture work with very little compensation, and one is subsidized interest capital and sometimes even a negative real rate of interest, and then there are other forms of grants, et cetera. What are kind of the top three that the USTR and all of us should focus on in trying to understand the competition from China?

Mr. SCISSORS. Well, I think the first thing is that you have to know in the sector you are dealing with—and this is across the

whole economy—are private firms, domestic private firms, Chinese private firms, foreign firms, foreign imports, are they allowed to actually outcompete Chinese State firms? If you are not, no matter what you do, if we know how incompetent certain Chinese State firms, they would never go out of business—and they never do—that has got to be the biggest subsidy.

I use numbers like trillions in my written testimony because that is the amount of money that is being transferred under the rubric of, “Our State firms cannot go out of business. They have to control the majority of the market. The rest, OK, knock yourselves out.”

The second one is financial transfers, because the cost of capital is extremely low for State-owned enterprises. It is essentially zero if they need to. And sorry to get a little technical here, Chinese money supply—remember I said that China’s wealth is \$40 trillion less than ours? Their money supply is bigger than ours. They have so much money in circulation that it overwhelms the size of their enterprises and the size of all the enterprises competing with them, which means their banks can just loan what are essentially infinite amounts of money.

Every single Chinese green energy firm of any size is a loss maker at the moment. It does not matter. They never go out of business. There is an infinite amount of money heading in that direction. So that would be number two.

And the third one you put your finger on. In some cities you cannot get land. You want to operate in certain cities, you are a foreign entity, you cannot get the land. It is not available to you. If you are domestic private Chinese entity, you can get it. It is incredibly expensive. If you are a State-owned enterprise, it is free.

And so I would not say that is an economy-wide problem, but in certain cities where land is very expensive, it is a killer because you cannot operate there and State-owned enterprises can operate there at no cost.

Mr. HINDERY. Can I just—

Chairman MERKLEY. Yes, Mr. Hindery.

Mr. HINDERY. Senator, could I just add two quick ones? Environmental, which is something you are most aware of as a Senator from the State of Oregon, is clearly an identifiable subsidy, their failure to meet even reasonable world standards on effluents and emissions. And you have to add to that not just the underlying low wages but also low-grade labor standards, something that you have talked about on numerous occasions. Where I admire Dr. Scissors’ work is it is complicated but it is not hard to calculate all of these subsidies, and work he has done and work we have done, and others, we just need to do it. And it runs the panoply, and Derek spoke to the Big Three. I would just throw in, as I said, environmental and labor standards as an adjunct to labor wages.

Chairman MERKLEY. Well, certainly that goes to this question of the race to the bottom that sometimes can occur within an international trading regime. And by that I mean you have manufacturers who are searching for the place that has the least cost in any form of environmental systems and the least cost in labor.

Now, as Dr. Berger pointed out, the world is changing, and hands-on labor is—I am expanding on what you said, so correct me if I am on the wrong track here. But essentially we have more and

more computer-driven robotics that can do just about anything the human hand can do, and, therefore, the differential in labor costs is less of a factor than it might have been even 10 years ago. Is that a fair way to put it?

Ms. BERGER. Yes, and I would say that even 10 years ago, people overestimated how important labor costs would be, even in their equations 10 years ago. There was a lemmings-like movement toward outsourcing in which people miscalculated how much advantage they could get sheerly from cheap labor. And I think that people are pulling back from that sort of calculation today.

Chairman MERKLEY. So just last year, I was at a technology conference and talking to venture capitalists, and they basically said our model is this: R&D here, but start from day one to plan the manufacturing in China. And, in essence, I thought that is so destructive to our ability to actually create jobs in manufacturing here in America.

Ms. BERGER. Can I just add on that that in the startup companies that we studied, companies that were reaching the point when they could commercialize products in semiconductors and above all in renewable energy, we saw the same movement to China. But now companies are moving to China not for the cheaper labor. Venture capital is insisting that you go to China simply because what you now have are these very competent supply chains. You have an explosive market for energy, so renewable energy, whereas in the United States exactly because we have a relatively stable energy market, many of these firms feel that they will have better customers or a larger market in China because of the explosive demand. And, second, we are finding that actually the Chinese at this point have become pretty capable manufacturers. So the story now is quite different than 10 years ago.

Chairman MERKLEY. Yes, Leo.

Mr. HINDERY. Senator, I find the comments that you heard in Silicon Valley immoral, and I wonder if regarding R&D tax credits, which in the Valley they use to develop products and then move the related jobs overseas, the R&D tax credit couldn't be substantially higher for a company who committed to keeping workers and developing jobs in the United States. Right now we have the perversity of using the base R&D tax credit to do what Dr. Berger talks about, and then they run overseas with the new jobs being created.

Chairman MERKLEY. Well, if you can indeed have the R&D subsidized here in the U.S. by the U.S. Government and the manufacturing subsidized overseas by the Chinese Government, you have a pretty sweet arrangement.

Mr. HINDERY. It is a sweet and immorally sweet deal.

Chairman MERKLEY. Yes, Dr. Berger.

Ms. BERGER. Thinking about the R&D tax credit, when we are looking at startup companies, they really do not have any revenues. So our R&D tax credit is really of no use to them, and it is actually of little use to the Main Street manufacturers either, because what they do does not get counted as really being "R." And so it really is a research and experimentation credit. And so you really have to—and particularly because innovation today mainly comes out of public and university laboratories. I just wonder whether, you

know, trying to actually implement something like Leo has suggested, whether that would really make very much difference in the actual location of production.

I think there we need a different set of changes in tax incentives. When you look at the Main Street manufacturers, they are paying full corporate taxes in the United States because they have no way of recycling their revenue through foreign—and they are in an entirely different situation than multinational corporations who often end up paying, as we know, something like zero in the United States.

So we have a tax system now that just treats the Main Street manufacturer in a very different way and in a much more onerous way than the large corporations.

Chairman MERKLEY. Thank you.

Dr. SCISSORS. Then I want to turn this over to Senator Warren.

Mr. SCISSORS. I am again in the position of demeaning 20 years of my own research by saying China is a symptom. It is not—what we need to do here is first is primarily here. The Chinese have much higher corporate debt levels than we do. They have much higher local government debt levels than we do. We focus here on the Federal deficit, which is a huge problem, but we should not get carried away that the Chinese are doing all this at no cost. It is not just visible costs you can see in their air and their water. It is also financial costs.

So I am not worried about endlessly unbeatable Chinese competition. What I think we do need—and I agree with my colleagues here—is fundamental changes here. Energy innovation has a possibility of changing the competitive balance between the U.S. and China. It cannot stop like, hey, you know, we discovered shale gas, it is all over now, it will be fine. We have to continue to innovate in energy. But we are in a much better place to do that than they are because they do not have any small energy companies that innovate. They do not allow them.

So we have a big advantage there. If we were to engage in fundamental tax reform, not nibbling away—my colleagues have talked about this, and I agree. It has to be fundamental. That could also change the competitive balance.

Another thing, as I mentioned earlier, when you have a long period of zero interest rates, you start having a lending environment that does not mean anything. Cost of capital means nothing. I do not care about—I know you, if your project has a tiny little return, I will take it because, whatever, you know, my borrowing costs are so small. When you have real interest rates, you get real projects that get funded, and people start looking for value.

So big things like monetary policy, tax policy, energy innovation, that is what is going to boost the U.S. position. I am not worried about the Chinese. I am more worried about us.

Chairman MERKLEY. Thank you.

Senator WARREN. Thank you, Mr. Chairman. I apologize for being in and out. This is a conversation that we started a couple of months ago. I learned a great deal then, and I very much wanted to be here for all of the continuation of it, but we have got flood insurance on the floor, though, right now in the Senate. A flood on the floor. And so I had to be there for part of it.

So I want to thank you, but I want to go back to something we have talked about before, and this is about the notion of the German model of manufacturing, the idea that there are high-wage, high-skilled jobs, and that that is where we are aiming. We are not aiming for the Chinese jobs. We are aiming for the German jobs that help us build a strong and robust middle class. But the question is: How do we get there? And we were once there. We are just not there now.

And so, Dr. Berger, you talk about how it is that German firms—you talk about this in your research and in your book—can bring innovation to markets so much faster than we can here in the United States. You talked about some of this in your testimony. And I made a note of the things you talk about: relatively easy access to suppliers, local research institutions, university–industry collaborations, a lot of things that right now small- and mid-sized manufacturing just does not have access to.

So my question is, and it is for all of you, but I want to start with Dr. Berger: What are the changes we could make in Federal policy that would help support this kind of environment of sort of chain that would help support mid-sized manufacturing?

Ms. BERGER. I think that if we move to—when we give public funds, we should be giving public funds in whatever form, whether tax credits or subsidies, not to individual companies, as we so often do today when communities give tax breaks to a company that will move into town, and that is a process that leads to one community basically competing with another. I think we should be trying to support institutions like the new National Additive Manufacturing Innovation Institute that has been set up in Youngstown or like SEMATECH or like some of these other institutions in which we are encouraging coalitions, teams of small and medium enterprises, large manufacturers, universities, and a variety of different—community colleges and large universities, to come together, and in which the withdrawal of any single partner would not kill the institution.

What we have seen in SEMATECH, the consortium of semiconductor manufacturers, is that some partners have moved—some companies have moved out; others have moved in. But this institution encourages roadmapping that allows companies to reduce their risk by combining some of their efforts, and it allows companies to sponsor pre-competitive research together. It has kept the semiconductor industry as a very vital part of the American economy. There are 250,000 jobs in that industry, an industry that in 1987 looked like it was about to disappear under the pressure of Japanese competition.

So initially the Federal Government actually supported that, but now it is basically supported by private companies and to some extent by the State of New York. It also needed, however, special antitrust protection, so that was another part of our effort there.

Senator WARREN. Good. Was there anyone who wanted to add to this? Mr. Hindery.

Mr. HINDERY. Senator, three quick comments. If you are a company that is dependent on a supply chain, your great fear is that the chain will be rolled up behind you. And our failure to enforce our trade laws creates that palpable fear. When you talk to the

SMEs about what is really holding them back, they say two things: one is a changed competitive environment out of their control; and something you are familiar with especially on a personal level, which is access to credit.

The big banks might get back to lending to this category. I am not sure, which is why I spend so much time on the Small Business Initiative, development banks, Export-Import Bank, things of that sort, which are institutions that we can direct more readily their behaviors.

The one closing comment, when you had stepped out, I mentioned to Senator Merkley, in 2010, following a dinner in Silicon Valley, the Machinists Union promised Apple that they would take every Chinese job and move it to the State of Oregon and promised a comparable product.

Chairman MERKLEY. If only we could turn the clock back and make that happen.

[Laughter.]

Mr. HINDERY. And it was an offer made by Tom Buffenbarger to Steve Jobs, and it was rejected. And it was rejected in very large part because Jobs knew that he could continue to go to the well in China for subsidies if the prospect was that Chinese jobs would head back to the U.S. This sense that every solution can be found in high-tech manufacturing also troubles me greatly. If I want to see manufacturing grow from 12 million jobs to 24 million and higher, then I look to my colleague from Portland. Those jobs, these are hands-on jobs. These are the jobs that Senator Merkley's father and I had growing up. And they are good jobs. We do not have to always be talking about the high, high end of manufacturing, because if we only do so, then we are going to be leaving millions of American women and men behind.

Senator WARREN. Thank you.

Ms. Skirvin, would you like to weigh in on this?

Ms. SKIRVIN. Yes. Thank you for the question, Senator Warren. It is important to fund public education and to enhance and focus on technical training at the high school level, but even through programs like STEM to go to a lower level to encourage children at the youngest levels in the areas of math and sciences and really look at their attributes and their capabilities and encourage them in the technical arena or engineering. We should encourage public-private partnerships, and Workforce Investment Councils and community colleges to enhance their technical programs. We are doing some of that locally to identify new hires and take that opportunity to give them more skills, but funding and support of those programs is very important.

Senator WARREN. Good. And, Dr. Scissors, did you want to add anything, or are we good here?

Mr. SCISSORS. I think we are good.

Senator WARREN. OK. Good. I wanted to give you a chance if you wanted to.

Can I just keep going? Is that all right, Senator? Thank you.

I want to talk about something else, and you alluded to it here, Mr. Hindery and Dr. Berger both, in your prepared testimony. You talked about the question about access to funding, and I very much appreciate the point that you make about looking for alternative

ways to fund. But I want to go back to the heart of this, and that is, right now the Fed discount rates are available to the largest financial institutions in this country, and they are effectively at zero.

So the question is: How do we get these larger financial institutions to start lending to smaller manufacturers again here in the United States? Mr. Hindery, can I start with you?

Mr. HINDERY. I think an enormous opportunity was missed, Senator, in that there was no “quid” for the “quo” in the bailout. There are reserve requirements that could be lessened for lending to the SME community. And for certainly the next year or so, we are going to continue to discuss the vagaries of Dodd-Frank and other aspects of the reform.

I think that you have to ask these banks to get back to lending, and whether you do it through reserve relaxations or just a demand for the benefits that continue to flow from the Federal Government to their bottom lines, we need some balance here.

I do think that if you look—and you used the example, Senator, with Dr. Berger of Germany at the very specifics of the German development bank, that would have been a chapter in my book. Their development bank is stunning. It is size-insensitive. It goes deep into the chain, and it is not just the Mercedes Benzes of the world and the Audis that can attract German development monies. It is down deep into the SME community. We need to do that. We also need to have a much more vital Export-Import Bank that uses an SME track as part of the approval process.

Senator WARREN. You know, and I will pick up on that, because the point about the Export-Import Bank, even there, whether or not it is getting enough funding down to the smaller manufacturers, do you want to comment on that?

Mr. HINDERY. I know the Export-Import Bank well, and it does not at all achieve that objective. It really only does whatever Boeing asks it to do, and it does not go down deep into the supply chain. I believe that if you want an Export-Import Bank loan, then you should have to respect the entire supply chain, for it is the taxpayers’ money after all.

But the other issue, Senator—and, again, I regret that you had walked out, is our great need for a National Infrastructure Bank. If we can keep it from increasing the Federal deficit, get it properly sized, as Senator Merkley often talks about, toward \$1 trillion, and put a Made in America or domestic content requirement on it, then that is millions of instant new manufacturing jobs that would be created.

Senator WARREN. Dr. Scissors.

Mr. SCISSORS. Again, I will give you the global perspective on this, and I realize there are a lot of American policy issues that I am sort of touching on. I do not mean to. I mean to just talk about the global side, and let us just use Japan, because they are the longest period. The Japanese banking system is terrible now, and it never got any better. And it is impossible for it to get any better. I mean, Japanese banks have moved offshore and become very good banks. But there has not been any improvement in Japanese domestic capital allocation, and let us just think about this logically. Let us say we are making milk and we set the price of milk to a penny. What are you going to be doing in that situation? Who is

going to be lending? Who is going to have the milk innovation? When you have no prices, you cannot have a functioning market.

So what I would urge—and, again, this is the international perspective—is when you are thinking about how to get credit to where it should go, to the most productive companies, you cannot do that when you have no real prices. You cannot do it. So proposals that are made, whatever they are, should be in the context of normal interest rates. And if for macroeconomic reasons, for whatever reasons, we cannot get there for 3 or 4 years, OK. But without that, it will not work. The Japanese have tons and tons of money; they have tons and tons of Government options on that sort of financing; and their banking system is awful because you cannot have—sorry to be—I am getting a little nerdy here. You cannot have financial intermediation when you do not have a price. You cannot have a banking system when you have an interest rate that is the base interest rate that is set to zero, a banking system that finds good projects.

So all I want to do, without saying anything about U.S. policy options, they need to be explored in the context of going back to normal interest rates, 10, 15, 20 years ago. That is where the Federal Government can make a difference. Otherwise, you are just swimming in this sea of liquidity and nothing really happens.

Senator WARREN. You make a very fair point about this and about the effect of interest rates. But we cannot use that as an excuse to obscure that there seem to have been structural changes in how lending occurs in the United States, and that the smaller financial institutions as a proportion of their capital are disproportionately engaged in small business lending, because small business lending has to be crafted in a—they tend to be one-offs. You have to understand the business that you are lending to.

Large financial institutions as a proportion of their capital in play are moving—it appears that they are less enthusiastic about doing small business lending than they were a decade ago. And a decade ago, they were less enthusiastic than a decade before that.

So as we see a shift in the banking industry, where we see so much more concentration in the larger financial institutions and so much squeeze on the smaller financial institutions, it has an echo effect in manufacturing in squeezing access to capital. So these things are interactive. It does not take away from your point. But your point is not the only change that is going on at this level, and that is the part I just wanted to explore.

You look like you wanted to say something more, Dr. Berger.

Ms. BERGER. Yes. I would say that what has happened is that when we talk about local banks, the local banks now are national banks that have purchased the local banks. So there no longer is someone who knows local industry. There is no longer a person who can actually appreciate the circumstances of the small and medium manufacturer that they are talking to. And so the scene has changed entirely in a way that makes it really difficult for this national bank that may be locally present in Ohio to actually understand local industry well enough even to make reasonable decisions about who to lend to and how to lend to them. So I think we have had a structural change, and so that is the one we have to fix.

The other point I would like to make is that the same financial market pressures that led to the fragmentation of American industry from the 1980s on are still eating up American manufacturing. One of the promising companies that we saw in Ohio was a company called Timken that makes tapered bearings, power transmissions, and steel. And in May, we learned that two of their shareholders—this is the California State Teachers retirement pension fund plus Relational Investors, another activist asset firm—have demanded that this firm actually split into two. This is exactly the same process that we have seen since the 1980s. Why? Because investors want pure play investments. So this company, which is more or less one-third a specialty steel company, two-thirds a bearing transmission company, and which believes that there are synergies in production between these two activities, is actually being broken up by investors. We have seen this again and again across the manufacturing sector. And I think this has really had—I mean, I am not talking about the particular circumstances of this company, but this is a process that continues and that has very negative effect.

Senator WARREN. Mr. Hindery, as long as the Chair is going to indulge me here.

Mr. HINDERY. Timken Roller Bearings, is in Hamilton County, Ohio. In the last decade, Hamilton County experienced more unemployment than any other county in the United States because of the transfer of production out of the United States to Chinese roller bearing companies, and the splitting up of the company which is being talked about today is simply a desperation Hail Mary pass. This company was one of the great American companies, and it was emasculated by unfair China trade, pure and simple. Under China's Indigenous Innovation Act, you cannot readily buy Timken bearings in China today.

Senator WARREN. So, Mr. Chairman, forgive me, I have been called away again. I do want to say that this point on finance, it is not only whether or not finance serves to help support the manufacturing we need, but whether or not finance has actually helped destroy much of the manufacturing we need. And so I appreciate your very thoughtful comments on that. Thank you. And thank you all. And I apologize that I am not here for every word of this. This is terrific.

Thank you, Mr. Chairman.

Chairman MERKLEY. Thank you very much, Senator Warren.

We are going to conclude in a few minutes, but in the course of getting there, I want to draw back in the on-the-ground experience that Ms. Skirvin represents. You noted in your conversation, you said, "We need a lot more people who are ready to work." I was involved in a conversation recently where folks were saying, "How can it be that this is really a problem?" Because we see folks who are so ready to work, they are working two or three jobs at minimum wage trying to support their family. There seems to be a work ethic there. But I think they are referring to the challenge of folks coming up maybe out of high school or community college into the manufacturing sector, and they are not prepared to show up on time or to pass a drug test. Is that the gist of it? Or would you like to expand on that?

Ms. SKIRVIN. Thank you, Mr. Chairman. With regard to ready to work, the employable workforce typically does not have the necessary skills to enter the workforce and perform the work needed in the technical jobs. Young people coming out of high school do not have hands-on training. They do not have basic shop math skills that are truly necessary to form a foundation for a technical worker to be a machinist or to be a welder. Employable workers are willing to work, but do not have skills, knowledge, and hands on experience to qualify for the positions. Sometimes we have problems with qualifications in other ways, but the emphasis really is that we want to identify those people with those aptitudes for technical skills and open doors for them, reach out to them through partnerships with the community colleges, like Clackamas Community College, and the Workforce Council, and identify people with attributes in the technical arena and create opportunities for them to obtain technical training and skills.

Chairman MERKLEY. So it really is not an issue of work ethic or discipline. It is an issue of being prepared and knowing how to basically have an affection for and an ability to utilize tools in the manufacturing setting.

Ms. SKIRVIN. It is. I have been a member of our team for over 10 years now and worked on the missile defense program, and the pride that people take in forming silos and silo interface vaults to defend this country is amazing. It is very humbling to be on our shop floor when we are doing that work. They take it very seriously, and they are dedicated. They work through holidays. They travel on weekends to go to the site and support the work that needs to be done. And I think creating those opportunities and identifying those young people that have that work ethic is something that we need to do and do more outreach on all levels.

Chairman MERKLEY. So do we need to radically modify No Child Left Behind in this regard? I say that in the context of what we have seen in schools throughout Oregon—at least this has been my impression—is that in the face of competing for a set of—the reputation of the school is based on a couple key tests and how their students perform. Anything that is not bearing upon the success of that school on those tests has essentially been unfunded, from art to music to gym to shop classes, or as we now call them, “career technical education.” And I think about how when I was growing up—and I still live in the same community now—the kids in the community, working-class community, they built things in their garage, and they built things in part because their parents built things, their dads built things. They worked on cars. They built mini-bikes. They built go-karts. They grew up using tools. And that was complemented by shop classes starting in junior high school. So I had wood shop, I had metal shop. I am sure there are still some treasures sitting in my parents’ basement that only a mother could treasure.

[Laughter.]

Chairman MERKLEY. But we do not have that now because kids come home. And they are not in the garage making things with tools. They are on the computer in all sorts of different ways. And then there is not any shop classes. So I have proposed a BUILD Act which essentially is about funding career technical education or

shop classes in junior high and high school. And I think there is also a place here for STEM—science, technology, engineering, and mathematics—to play as well and get kids excited in robotics and a whole series of things of how math applies. I think the two are complementary. But that then creates a foundation for folks who say, well, I really want to pursue that welding course at the local community college, and then I will be ready to build things, the great variety of things that you make in Clackamas.

Any insights about that?

Ms. SKIRVIN. Senator, I absolutely agree with you. There is always room for improvement, and having a niece and nephew, attending middle school and high school, it has been difficult to see the lack of opportunities for those types of classes when they and their friends demonstrate those aptitudes. It is incumbent upon the family and parents to encourage and support access to these opportunities in the absence of them being available. Absolutely, I think funding those types of programs at the middle school level and also at the high school level, and even lower, is essential, and encouraging and developing those skills in our community with our children at an early age and encouraging them as a viable path forward, whatever it takes.

Chairman MERKLEY. Thank you very much.

Dr. Berger, you used a phrase. I was searching for it, but it is there—is it the “culture of innovation” or the “community”? What was the term?

Ms. BERGER. Ecosystem?

Chairman MERKLEY. Ecosystem. Thank you. Ecosystem. Do you see this as a key challenge in the ecosystem, the lack of kind of hands-on tool experiences in junior high and high school?

Ms. BERGER. I think it is absolutely critical that we provide those opportunities to students to have hands-on experience. In fact, at MIT, which is a university, our motto is “Mens et manus,” “Hand and mind.” And we can see even among our students across fields the pleasure in actually making things. And this is certainly, I think, one of the real strengths of American life and American culture. And I believe that the problems with recruiting people for the manufacturing workforce have to do with the insecurity of those jobs and low wages in those jobs.

I totally agree with Leo Hindery. Everybody is not going to be working in advanced manufacturing or highly automated plants. A lot of people are going to be making things with their hands, and this is something I think people like doing and that we need to provide opportunities for.

I would just like to mention that, as part of our research, we did a survey and got responses from 1,000 manufacturing establishments to see if they were finding workers with the skills they needed, and we asked them one question, basically: How long did it take you to fill your last vacancy? Three-quarters of the factories responded that they could do it in less than a month. So overall we still do have a lot of people who actually can fill the jobs that we have.

The other 25 percent of the companies that were having more trouble, often wanted skills that were not available. But the problem that you actually mentioned about bad behaviors, bad work

ethic, or cannot pass the drug test, that turned out to be a very small part of the problem of filling the jobs, even in the 25 percent that had trouble. So it is kind of an urban myth, I think, that this is really a significant fact.

Chairman MERKLEY. Well, thank you, and I want to turn to the last connection between the ecosystem and the work on the ground, and that is, we talked about the skill sets, but the other is financing. And we have heard a little bit about Germany where I believe two-thirds of the funding comes through bank loans. In the U.S. it is more bonding. And so what is your experience in terms of the challenges? Your company has many, many projects, a sizable company for Oregon, and you undertake new projects, like the streetcar. Any insights as we wrestle with this question of access to capital?

Ms. SKIRVIN. Yes. Thank you, Senator. Oregon Iron Works, as you said, is a diverse company, and we are in industries that have higher risk, such as the marine industry. In searching for a surety and bonding capacity to bid and have the capacity to bid on these jobs and enter markets and continue to grow as a manufacturer, we actually had to go outside the U.S. market for our bonding capacity. The lack of access in the U.S. was hindering our ability to grow our business. One of the reasons why Oregon Iron Works is so successful is because of our diversification, and our innovation in the Marine Division in the Nuclear Division, or in missile defense. So we are always learning in the different areas that we are working in, and the market and what is available for opportunities to do work is going up and down.

To be diversified and to have the ability to grow into different industries like United Streetcar, companies must have access to risk management from a financial standpoint, with insurance, access to capital, and also with sureties.

Chairman MERKLEY. OK. That raises more questions than we have time for, but we are touching on a whole lot of different aspects of the American economy and international economy. And so this is very important to those of us here in the Senate as we wrestle with creating living-wage jobs and a foundation for families to thrive and certainly as we also ponder the investment that we need to make for the success of the ongoing next generations in both the education side and the infrastructure side.

Thank you very much for your testimony. We will keep the record open for questions, as I mentioned at the beginning, and with that I adjourn the Subcommittee.

[Whereupon, at 5:05 p.m., the hearing was adjourned.]

[Prepared statements supplied for the record follow:]

**PREPARED STATEMENT OF SUZANNE BERGER**

RAPHAEL DORMAN—HELEN STARBUCK PROFESSOR OF POLITICAL SCIENCE, AND  
COCHAIR, MIT PRODUCTION IN THE INNOVATION ECONOMY

DECEMBER 11, 2013

Chairman Merkley, Senator Heller, Members of the Subcommittee and Committee, thank you for the opportunity to testify today about the challenges and opportunities for rebuilding American manufacturing.

My presentation today builds on findings from 2½ years of research at MIT on the role of manufacturing in getting innovation into the market place. The research was conducted by a group of 20 MIT faculty from disciplines ranging from engineering, social sciences, management, to biology. The United States is a powerhouse of new ideas, new technologies, new products and processes. Many people question, though, whether we need production capabilities located in the United States in order to reap the full benefits of these innovations in the form of good new jobs, strong companies, and sustainable economic growth. Many of the companies that have been most profitable over the past two decades are ones with R&D, design, and distribution in the U.S., but which outsource their manufacturing around the world. Without production capabilities in the U.S., can we generate new growth and jobs? Is this a model that would allow us to grow new industries in sectors like biotech, medical devices, and new materials where there seems to be a tighter connection between R&D and production? Can we even sustain innovation without manufacturing capabilities in the U.S.? The bottom line finding of our research is that manufacturing does play a vital role in commercializing innovation. To move our economy onto a trajectory of sustainable growth and creation of new good jobs, we need to bring innovation from across the country—from high-tech start-ups, Main Street manufacturers, Fortune 500 companies—at greater rate and speed into the market. The critical policies to accelerate these processes are private–public partnerships to rebuild the industrial ecosystem.

At the time the MIT research began in 2010, pessimism about the future of production in the United States was sweeping across the country. Millions of manufacturing jobs had disappeared over a decade. People were questioning whether U.S. manufacturing could ever compete with Asian low-wage production. The trade deficit in advanced technology products was deepening—equal to 17 percent of the total U.S. trade deficit by 2011. It seemed that even high-tech sectors of industry were doing better overseas than here.

Everyone agreed that the U.S. needed a higher rate of good job creation, but no one seemed to know where jobs could come from. Could manufacturing jobs come back? The brightest corporate superstars, like Apple, were locating production abroad and still reaping the lion's share of profits within the U.S. Was this going to be the American model for the future? In emerging technology sectors, like batteries, solar, and wind, even when the startups were created in the U.S. out of U.S. innovations, commercialization of the technology was taking place abroad. What could Americans do to leverage their strengths in new science and technology to rebuild a dynamic economy? Would production capabilities at home be needed to capture the flow of benefits from invention and entrepreneurship? Which capabilities? And how could they be created and sustained?

The point of departure for the MIT Production in the Innovation Economy research was recognizing that innovation is critical for economic growth and for a vibrant and productive society. Our question was: what kinds of production do we need—and where do they need to be located—to sustain an innovative economy? As Professor Richard Freeman, a Harvard economist, has put it, a person knows it's a manufactured product when he drops it on his foot. But for most valuable activities today, the traditional line between “manufacturing” and “services” has become so blurred that it no longer serves to distinguish separable and distinct activities or end products. Whether in a giant like Apple or in a small Ohio company that makes half-sleeves to repair pipelines and sends its technicians along with the product to stand on the oil platforms and shout down instructions to the divers, the activities that create most value, that is, the ones that are most difficult for others to replicate, are bundles of an object you could drop on your foot and of services. We focused on those bundles, and we structured our inquiry to locate opportunities and dangers for American prosperity in the changes that have taken place over the past 30 years in the linkages between an innovation and the broad range of production processes that bring it to market.

There are many serious reasons to worry about the fate of manufacturing in the United States. Virtually every week brings a new report diagnosing the state of manufacturing and emphasizing different aspects of its critical significance for the

economy. One of the key danger points identified in these reports is the declining weight of the U.S. in the global economy. Even though the U.S. share of world manufactured output has held fairly steady over the past decade, economists have pointed out that this reflects good results in only a few industrial sectors. And even in those sectors, what appear to be productivity gains may be the result of underestimating the value of imported components (Houseman 2010). A close look at the composition of a worsening trade deficit shows that even in high-tech sectors the U.S. has a deteriorating picture. While the output of U.S. high tech manufacturing is still the largest in the world and accounted for \$390 billion of global value added in high-tech manufacturing in 2010, U.S. share of this world market has been declining, from 34 percent in 1998 to 28 percent in 2010, as other countries made big strides ahead into this market segment. Jobs are another huge concern. The great spike in unemployment over the past 5 years was disproportionately due to loss of manufacturing jobs. And as the economy revived, such jobs were slow to return. Many of them never will. Over the long postwar years of prosperity, manufacturing jobs had been especially valuable to workers and valuable for middle-class opportunity because they paid higher wages and had better benefits than other jobs available to people with educational qualifications of high school or less. New manufacturing jobs now often come with lower wages and fewer benefits attached. National security is also linked to the health of manufacturing through the procurement of new weapons and the maintenance and replacement parts for the many generations of equipment still in service. The wave of disappearance of many small- and medium-sized suppliers creates worrisome and still relatively unknown degrees of dependence on foreign suppliers for U.S. military contractors. Across the entire industrial landscape there are now gaping holes and missing pieces. It's not just that factories stand empty and crumbling; it's that critical strengths and capabilities have disappeared that once served to bring new enterprises to life. Economic progress may be preceded by waves of creative destruction, as Joseph Schumpeter claimed. But we need to know whether the resources that remain are fertile enough to seed and sustain new growth.

Today digital technologies and borders open to the flow of ideas, goods, and services make it possible to build international partnerships for bringing innovation into production and into the market. For U.S. innovators there are unprecedented new opportunities to draw on production capabilities that they do not have to create themselves. But there are also long-term risks in these relationships, and they go far beyond the loss of any particular proprietary knowledge or trade secret. The danger is that as U.S. companies shift the commercialization of their technologies abroad, their capacity for initiating future rounds of innovation will be progressively enfeebled. That's because much learning takes place as companies move their ideas beyond prototypes and demonstration and through the stages of commercialization. Learning takes place as engineers and technicians on the factory floor come back with their problems to the design engineers and struggle with them to find better resolutions; learning takes place as users come back with problems. And in the challenges of large-scale production, companies like 3M and Gillette find a terrain for innovation that allows them to reap higher profits.

There are reasons to fear that the loss of companies that can make things will end up in the loss of research that can invent them. When we visited the laboratory of MIT Professor Tonio Buonassisi, a leading researcher on solar cells, he pointed out all the leading-edge equipment that came from tool makers located within a few hours of Cambridge, Massachusetts. Much of the machinery had been made in close collaboration between the lab and the instrument companies as they handed ideas and components and prototypes back and forth. Used for the first time in the lab, these tools were now being marketed to commercial solar companies. The news on the U.S. solar industry was looking worse and worse as the economy stalled, as stimulus spending on renewable energy ended, and Chinese competitors hung in, despite losses and low margins. If the local equipment makers Buonassisi worked with were to collapse it would mean real trouble for research, for the scientist relied on working with them to make new tools faster for more efficient and cheaper cells. Even in a fragmented global economy with instant connection over the Internet to anywhere in the world, the ties that connect research in its earliest stages to production in its final phases remain vital.

### **The MIT Production in the Innovation Economy Study: Objectives and Methods**

The approach of the MIT Production in the Innovation Economy project was to focus on one broad question: how production capabilities here and abroad contribute to sustaining innovation and realizing its benefits within the United States. We organized our research to discover what it takes to sustain innovation over time and

what it takes to bring innovation into the economy. We approached these questions from multiple angles, looking at innovation in products, in processes, in combinations of products and services; at innovation in startups, in large multinationals, in Main Street small- and medium-sized manufacturers, in European and Asian partners and competitors, in hotspots for new technologies, like the biotech cluster of Cambridge, Massachusetts, in traditional manufacturing country, like Ohio, and in new manufacturing areas in the Southwest, in Arizona, in China, and Germany.

To retrace the pathways through which an invention or a new idea about a product or a way of improving a product or process get made into goods and services for sale in the market, much of our research was conducted in firm-level interviews. National Science Foundation statistics state that in 2006–8, 22 percent of all U.S. manufacturing firms reported “a new or significantly improved product, service or process” (NSF 2012) but we did not know what they were doing or how they were doing it. There is data, too, on the high-risk venture and corporate funding of startups, but no systematic account of how these firms find the full range of inputs they need on the road to commercializing their innovations. In the interviews with senior managers we could trace out in concrete detail the trajectories along which each company moved as it attempted to make its ideas into profits. Where did the company get the inputs it needed to bring innovation into production? Did it find these inputs at home or abroad? Where and why did it decide to locate each of its operations? Which parts of its production activities does it believe it needs to keep in close proximity to its R&D in order to bring a product to market and to maximize the gains from its own innovation? In the case of innovations growing out of existing process or product technologies, our interviews in companies allowed us to track interactions between the innovators and the manufacturers in great detail from the point at which the new idea came into play through production into the hands of customers.

In all PIE interviews (see Table 1) teams of MIT researchers raised basically the same questions, with wording adapted to the context and circumstances of each company. The interview template prompted each researcher to ask: Tell us about two or three new ideas—new products, new processes, improvements on old products or processes—that you tried to bring to market over the past 5 years. What did you do to try to move it from the stage of being an idea (in a lab, in an R&D center, on the shop floor, in your head) into a product that was sold in the market? Where did you find the capital for the various stages of scale-up? Did you self-finance? Or get venture capital? Or bank loans? Or corporate partners? Where did you find engineers and workers with the right skills? Where did you find technical know-how? Where did you find suppliers? How did you decide what to do in-house and what to outsource? How did you decide where to locate production? What failed and why? What policies make a difference for a company like yours?

Table 1 PIE Interviews

China	36	
France	2	
Germany	32	
Israel	1	
Japan	8	
Sweden	2	
Switzerland	3	
United Kingdom	2	
United States	178	→
<b>Total</b>	<b>264</b>	

<i>Arizona (11)</i>	<i>Michigan (1)</i>
<i>California (16)</i>	<i>New Jersey (3)</i>
<i>Connecticut (2)</i>	<i>New York (12)</i>
<i>DC (2)</i>	<i>North Carolina (14)</i>
<i>Delaware (1)</i>	<i>Ohio (37)</i>
<i>Georgia (12)</i>	<i>Oregon (1)</i>
<i>Illinois (2)</i>	<i>Pennsylvania (9)</i>
<i>Iowa (1)</i>	<i>South Carolina (2)</i>
<i>Kentucky (1)</i>	<i>Washington (1)</i>
<i>Maryland (2)</i>	<i>Wisconsin (1)</i>
<i>Massachusetts (47)</i>	

The first group in our interview population were American-based multinationals that figure among the largest global investors in R&D. Ten of the firms in our sample rank in the top 100 of the Fortune 500 companies. Over the past 30 years these companies have changed from almost entirely U.S. based operations to organizations carrying out R&D and production around the world.

A second research focus was the population of new companies that grew out of patents that had been created in MIT laboratories and licensed by the MIT Technology Licensing Office over the years 1997–2008. There were 189 of them. The researchers set aside the pure software start ups and zeroed in on the 150 companies that were engaged in some form of production. These are starts-ups that are especially well-positioned to succeed, because they emerge from very strong research labs, because they take their first steps in the world in an extremely dynamic regional hub of innovation with many complementary resources in close proximity, and because they have far better access to early-stage high risk capital than do firms in much of the rest of the country. At those points in the scale-up process where these firms, even with all their relative advantages, find serious difficulties in obtaining the inputs they need for getting their products into the hands of customers, we can anticipate that the “average” new American firm based on innovative technologies will also be having trouble, so there are important lessons to be learned from their experience. There are, of course, many reasons firms might fail to find resources to scale-up, relating to the market, or competitive landscape, or the product, or management.

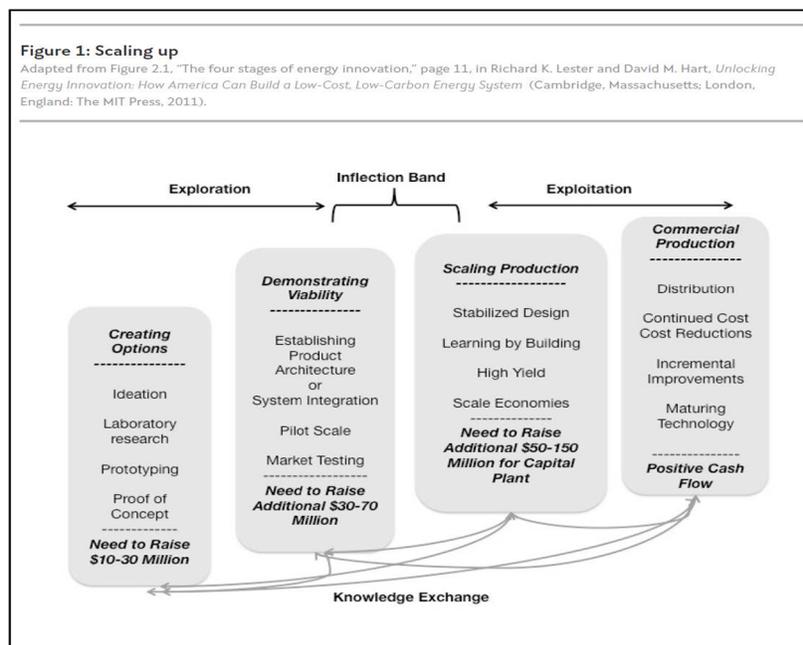
Table 3: MIT TLO Licensed Startups 1997-2008\*

Industry	# of firms started	Percent of total	Percent receiving SBIR	Percent receiving venture capital*	Percent operating <sup>^</sup>	Percent closed	Percent merged
Advanced materials and energy	15	10	40	33	73	27	0
Biopharma	58	39	36	59	55	26	19
Medical devices	31	21	39	52	65	3	32
Robotics	5	3	60	0	60	20	20
Semiconductors and electronics	26	17	31	85	62	19	19
Other	15	10	33	33	47	27	27
All production companies	150	100	37	55	59	20	21

\*Reported by VentureXpert

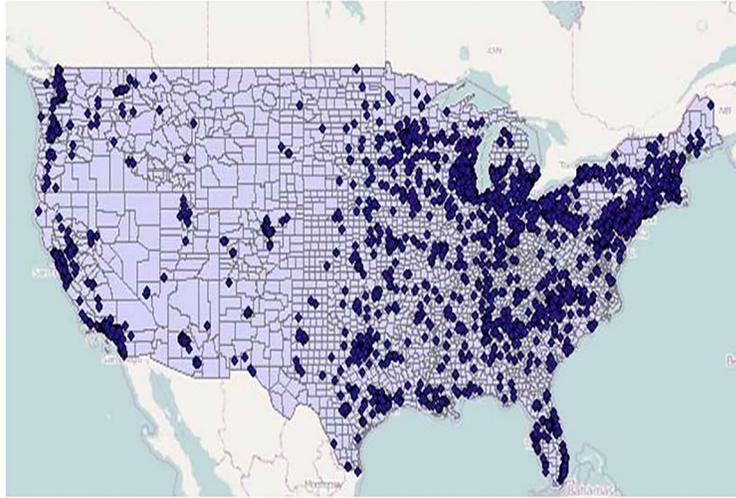
<sup>^</sup>-As of June 2012

The research team learned that these highly innovative companies were usually able to obtain funding through relatively long periods (even up to 10 years) of early phases of scaling up through early market demonstration. But many of them when they came to the stage of moving to full-scale commercialization could not find finance in the U.S. As many of them made the transition from venture funding to high-volume manufacturing, they had to look for foreign investors and often moved abroad to manufacture their products.



The third target population within the PIE company sample were small- and mid-sized U.S. manufacturers. To figure out how to raise the water-level of all kinds of innovations—product, process, service, incremental, radical, repurposing, business model—flowing into the economy, we need to look beyond Silicon Valley and Cambridge, Massachusetts. PIE researchers started from the population of the 3,596 manufacturing companies in the U.S. which had doubled their revenues and increased head count between 2004 and 2008 and had more than \$5 million in annual revenues and more than 20 employees. These companies were presumably viable, hence ones in shape to potentially carry forward new products and processes into the market. In Arizona, Georgia, Massachusetts, and Ohio we carried out interviews with 53 of these firms. To this group we added 43 similar firms that we discovered through other branches of our work.

**Figure 2: Company locations of the 3,596 Main Street manufacturers with more than \$5 million in annual revenues and more than 20 employees**



Innovation is not only in patents. The novel activities of established small- and medium-sized manufacturers rarely correspond to the OECD's Frascati Manual and "Oslo" definitions of "research and development." But there's also a hidden wealth of innovation in process, business organization, and manufacturing across America in firms of all sizes. Some have leading-edge innovations (and patents). But for most Main Street manufacturers, the major innovative activity is repurposing technologies developed in one sector for uses in different products and processes. A third-generation CEO of a Midwest company that makes steel components, for example, told us of developing special lighter steel he had used in construction and experimenting with bringing it into new work he was doing in defense contracting. For an important group of Main Street manufacturers, their role in innovation is as suppliers providing vital components and services to enable scale-up in other companies. One such company, Mass Tank in Middleboro, Massachusetts, exemplifies the pattern. It's a 50-employee firm that does its main business in fabricating tanks and selling tank inspection services for chemical, food, pharmaceutical, and water industries. But it is also working with five start-ups in the region and going back and forth with their engineers developing new materials and components that may someday be part of a blockbuster new product that Mass Tank will have helped these innovators to bring to market. In these suppliers, the greatest strength is a combination of design and fabrication capabilities.

But even the strong Main Street manufacturers we studied were not growing fast and were not creating many new jobs. Much of the reason why, we discovered, was that all scale up of new ideas depended on their internal resources. They were not finding any complementary capabilities they could draw on in the industrial ecosystem as they tried to develop new components. There are few local banks with local knowledge left in the U.S. to fund such scale up. Connections with community colleges, trade associations, research consortia are weak or not present. All these resources are plentiful on the landscape of German companies. As we wondered why the contributions to innovation of the Main Street manufacturers did not lead to greater profits and faster growth, the comparison with Germany was inevitable. An Ohio machine toolmaker is not going to take off like Microsoft or Facebook, but there are great underexploited possibilities for such firms also. We considered what it would take to galvanize more innovative activity within Main Street manufacturers, a faster uptake of new technology, and a tighter enabling connection with new start-ups across the economy.

The fourth group of firms in the PIE sample were foreign: mainly German and Chinese. Germany is one of the world's richest and most advanced industrial societies. China is still a poor-to-middle income country with rather low productivity and few companies that compete in world markets on the basis of unique products or processes. Yet both of these very different countries have companies that are world-beaters in scaling up innovation to market. In both Germany and China we found compelling examples of innovative manufacturing and scale-up that challenged many of our ideas about why innovative companies in the U.S. so often falter before attaining the size and capacity to reach large numbers of customers. The strength of German companies goes well beyond defending niches against low-cost competition with incremental advances. They create new businesses through the transformation of old capabilities and their reapplication, repurposing, and commercialization. The U.S. Main Street manufacturers we interviewed usually had only their own material, human, and financial resources to draw on when they tried to scale-up an innovation. They are "home alone." In contrast when the German firms expand into new sectors, they draw not only on strong legacy resources, but also on easy access to a rich and diverse set of complementary capabilities in the industrial ecosystem: suppliers, trade associations, industrial collective research consortia, industrial research centers, Fraunhofer Institutes, university-industry collaboratives, technical advisory committees. The differences in the density and availability of resources in the German and U.S. ecosystems explain much of the differences between the fate of manufacturing in the two countries.

The China interviews showed firms emerging with remarkable innovative capabilities in manufacturing. China's great initial assets were cheap factor prices—cheap land, labor, capital, and an undervalued currency. Low-cost labor allowed Chinese companies in apparel and footwear to make huge inroads in Western markets. But today the PIE research team found Chinese firms in emerging industries like renewable energy. These are firms that excel in scale-up to mass manufacturing not because of low-cost labor, but because of their ability to move complex advanced product designs into production and commercialization. The huge China market is of course a major draw for investors of all nationalities. But even in those industries in which the main customer markets are still in the West, as for consumer electronics, photovoltaic cell and module production, American and European innovators are turning to Chinese partners. Increasingly the reason is the solid capabilities in knowledge-intensive scale-up they find in China. These capabilities involve reverse engineering and reengineering a mature product to make it more rapidly and efficiently; making designs into new-to-the-world products and processes; and indigenous product innovation. In each of these categories PIE researchers interviewed Western companies and their Chinese partners and walked through the Chinese plants with engineers to track how exactly innovation was being produced.

Two other research groups formed within PIE to analyze critical inputs to bringing innovation to market: jobs and skills and advanced manufacturing technologies. For these research modules, the project used surveys as well as interviews. The group working on jobs and skills talked with companies, community colleges, high schools, and labor market programs across the country. Their sample of close to 900 manufacturing establishments is the first nationally representative data on what skills are needed and shortages occur. Since production workers account for over 40 percent of all those employed in manufacturing, the team focused on whether there is a shortage of skills in this population, as many have claimed. What skills do your workers need? employers were asked. Basic reading, writing, and math? To use a computer? To work in teams? To take independent initiatives? Have skill requirements increased significantly over the past 5 years? How long does it take to identify and hire the right candidate? The median answer was 4 weeks. Just under 20 percent of the establishments had some long-term vacancies (over 3 months) equal to 5 percent or more of their core production workers. The analysis drilled down into the job categories and firm types where there do seem to be problems finding candidates with the right skills. The problems centered in jobs requiring skills not generally available in the region; jobs requiring advanced math skills; and very small companies. Further probing showed that firms with few or no connections to other companies in their area and few or no connections to local schools also had more hiring issues. The research group conducted interviews in regions with programs that have brought together industry, schools, and Government funding to work on these problems with some success.

The team working on advanced manufacturing technologies queried engineering colleagues across the country in order to try to locate the potential sweet spots for technologies that could radically speed up the passage of new goods and services from the lab bench to market. Using the surveys and interviews, the team identified and ranked the promise of seven major technology groups. These technologies could

accelerate growth and energy efficiency by transforming manufacturing. Today, manufacturing is a lengthy and often inefficient process in which the raw materials which nature provides are pushed through stages of fabrication, assembly, and warehousing and emerge as goods for sale in the market. In a future which new technologies could enable, manufacturing might become a rapid process in which human-designed and engineered materials would be pulled by demand through continuous manufacturing and customization to meet specific and differentiated human needs. Today manufacturing remains highly centralized and concentrated in large factories and components and finished goods are transported at great cost and with high impact on the environment through long supply chains. Trends to offshoring and outsourcing have made manufacturing plants bigger and the distances goods traverse even longer. Tomorrow we can imagine technologies that would “destroy the tyranny of bulk” and distribute manufacturing, thus making it possible to manage capacity and demand flexibly through networks of small, localized manufacturers linked by Internet.

### **The Great Transformation: The New Corporate Structures of the American Economy and the Origins of the Production Problem**

Fifty years ago, at the high water mark of American economic dominance in the world, 29 percent of U.S. workers were employed in manufacturing (January 1960), wages of the manufacturing workforce had been rising for decades, and innovation and manufacturing moved together in lockstep to produce a vast new stream of products for the market. Invented in the USA meant made in the USA. New products were first scaled-up, standardized, mass produced, and brought to high levels of performance and reliability in the advanced industrial countries in which they were invented. Only when production matured and the good became a commodity did manufacturing shift to less-developed countries with less-skilled workers.

Today invented in the USA no longer means made in the USA. Given the capabilities that now reside abroad, the next generations of consumer electronic products designed in the U.S. are likely still to be made in Asia—even if wages continue to rise there. In some industries today, it would be very difficult to do early-stage manufacturing in the U.S., because the technical expertise, the workplace skills, equipment, and the most advanced plant lay-outs are no longer present in the country or have degraded and fallen behind state-of-the-art elsewhere.

It's not only in “mature” industries like apparel that manufacturing has moved overseas. It's in newer sectors, like solar cells, wind turbines, and batteries. In the past chip design and chip fabrication had to be carried out within the four walls of the same company; today chip designers can send files of digital specifications to semiconductor fabrication plants anywhere in the world for production. Apple can define, design, and distribute iPods and iPhone and iPads in the U.S. without having any significant production facilities here at all.

How did this new global economy of fragmented research, development, production, and distribution come into being? What does it mean for the future of the U.S. economy? There were multiple causes of this transformation including many taking place outside the U.S., like the rise of emerging market competitors and large new consumer markets. But what stands out in the PIE analysis is the impact of a tectonic shift in corporate ownership and control that took place well before globalization or Asian development had come into full play. The driver was financial market pressure for higher quarterly returns from companies that were less diversified, “asset-light,” and organized around core competence. From the 1980s the large vertically-integrated corporations that had long dominated American manufacturing began to shed many of their business functions from R&D and design through detailed design to manufacturing and after-sales services. These activities had all once been joined under one corporate roof. By 2013, however, very few large American companies remain with vertically integrated structures. Companies like General Electric or Procter & Gamble with a wide range of different businesses under one corporate roof and a predominant preference for integrating research through production are the exception.

First among the business functions that companies started moving out of their own corporate walls was manufacturing—for that shift produced reductions in headcount and in capital costs that stock markets immediately rewarded. Advances in digitization and modularity in the 1990s made it possible to carry out this strategy and to outsource production to manufacturing subcontractors like Flextronics and Jabil and eventually to foreign suppliers and contractors like Taiwan Semiconductor Manufacturing Company, Quanta, and Foxconn.

Out of those changes in corporate structure have come not only great new opportunities, but also some of the most difficult hurdles we face today in trying to move U.S. innovation into the market. Here we can only list some of these challenges:

- Vertically integrated enterprises used to organize and pay for educating and upgrading the skills of much of the manufacturing workforce. They had the resources to do this. And long job tenure meant companies could hope to recoup their investment over the course of the employees' careers. Many of the employees who were trained in big companies or in vocational schools they supported ended up working for smaller manufacturers and suppliers. Today, American manufacturing firms are on average smaller, and have fewer resources. They do not plan to hold on to their employees for life. They cannot afford to, or, in any event, do not, train. How do we educate the workforce we need?
- Vertically integrated enterprises like AT&T used to support long-term fundamental research in centers like Bell Labs and Xerox PARC and Alcoa Research Lab, each employing thousands of scientists and engineers. As corporate structures have been resized, basic research has been drastically cut, these centers have mostly disappeared, and corporate R&D is now far more tightly linked to the near-term needs of the business units. How should we fund a strong stream of basic and precompetitive research today? If much cutting-edge research no longer is taking place within companies—but in universities or small start-ups or in Government labs—how can we propel these innovations through to commercialization? How can we diffuse new technologies into established companies?
- When innovation grew out of large firms, they had the resources to scale up to mass commercialization. In the thirties, a corporation like DuPont not only invested for a decade in the fundamental research that led to nylon, but once the lab had a promising product, DuPont had the capital and the plants to bring it into production. Today, when innovation is more likely to emerge in small spin-offs or out of university or Government labs, where do the scale up resources come from? How available is the funding needed at each of the critical stages of scale up: prototyping, pilot production, demonstration and test, early manufacturing, full-scale commercialization? When scale-up is funded mainly through merger and acquisition of the adolescent start-ups and when the acquiring firms are foreign, how does the American economy benefit? How do American taxpayers who paid for much of the research at the origin of the process benefit?
- Big American corporations used in effect to provide public goods through spillovers of research, training, diffusion of new technology to suppliers, and pressure on State and local governments to improve infrastructure. These spillovers constituted “complementary capabilities” that many others in the region could draw on, even if they had not contributed to creating them. As the sources of these “complementary capabilities” have dried up, large holes in the industrial ecosystem have appeared. How can these capabilities be recreated and sustained in order to maintain a terrain favorable for innovation?

As the PIE researchers looked across the interviews and surveys we carried out in the project, we saw the holes in the industrial ecosystem as the single most challenging obstacle to creating and sustaining production capabilities in the United States that enable innovation to come to market. What we have come to think of as “holes” might be less picturesquely described as “market failures” or as absence of “complementary capabilities” that companies can draw on to supplement their own resources when they seek to develop their new ideas. These holes in the industrial ecosystem are ones that have been hollowed out by the disappearance of large numbers of suppliers under pressure from global competition and by the disappearance of local capabilities once provided by large corporations as part of their own business operations. As national banks have bought up local banks, local bankers with intimate understanding of local manufacturing have become an endangered species—making it harder to get bank loans. Critical suppliers have dwindled in numbers. In small firms as well as large defense contractors, we found companies considering the costly option of internalizing some of the functions their suppliers currently perform, for fear that what’s become a single-source supplier will go out of business. These are concerns even for current production. But the difficulties are far more challenging when a company seeks to develop a new or improved product or process. New inputs are needed, like different skills, finance, and components that firms cannot efficiently produce all by themselves. Even startup companies with great novel technologies and generous venture backing cannot do it all in-house: they need to find suppliers, qualified production workers and engineers, expertise beyond their own. Established Main Street manufacturers in the regions we visited find little beyond their own internal resources to draw on when they seek to develop new projects. They’re “home alone.” This environment is far different from that of the German manufacturers we interviewed who are embedded in dense

networks of trade associations, suppliers, technical schools, and applied research centers all within easy reach.

### **What's To Be Done? Pathways for Growth**

There is much work to be done on all fronts to renew the production capabilities that the United States needs in order to gain full value from its innovation. The PIE research, however, points to one objective as most urgent: rebuilding the industrial ecosystem with new capabilities that many firms of all kinds could draw on when they try to build their new ideas into products on the market. New research suggests that it's the colocated interdependencies among complementary activities, not narrowly specialized clusters, that over time produce higher rates of growth and job creation, and they do so across a broad range of industries, not just in high-tech or advanced manufacturing. The examples we have observed in the PIE research of trying to create public goods—or semipublic, or club goods—in the industrial ecosystem is the approach that may pay the greatest dividends.

The cases we have studied in detail are extremely diverse, but the institutions they have set in place involve a few common principles. The key functions that such mechanisms perform are convening, coordination, risk-pooling and risk-reduction, and bridging. They are public goods that the market does not generate. There are initiatives in which a private company or a public institution performs a convening function. The initiative usually starts with the “convenor” putting new resources on the table for use by others on condition that they too contribute to the pot. One well-known example is the SEMATECH Consortium that the semiconductor manufacturers and equipment makers formed in 1987 with financing both from the U.S. Federal Government and industry. SEMATECH today functions with funds from its members. By bringing companies together for roadmapping next generation chips, SEMATECH reduces the costs and risks of each company as it moves along the Moore's Law trajectory. New York State's investments in new fabrication facilities and new nanotechnology research in upstate New York at the College of Nanoscale Science and Engineering at the State University of New York, Albany, create common resources that the industrial partners can use.

Another example came from our Ohio interviews: the Timken Company, a manufacturer of tapered bearings and of specialty steels, initiated a partnership with the University of Akron and transferred Timken's coatings laboratory, its equipment, and several of its key researchers to the university. With resources from the company, the university, and the State, new graduate degree programs are starting; a new consortium on coatings and engineered surfaces has been created that is open to other corporate members; and a set of promising coatings technologies that had been “stranded” in a bearings company can now be developed as potential start-ups in which both the university and the corporate consortium members can invest. Potentially, companies from outside the region might join, but much of the value from participation will derive from face-to-face presence in the labs at the University of Akron, from being able to use university labs (funded at least in part with public money) instead of keeping these facilities in-house, and from the chance for local companies to hire graduates. In these cases the “convenors” hold out the lure of the use of common facilities and expensive equipment and training and proximity to cutting edge researchers. In contrast to tax breaks, which many States hand out, new resources are embedded in institutions that do not stand or fall on the participation of any one member.

Sometimes the lead in creating new coordination was taken by a private company. In other cases, coordination comes from a public intermediary. In Springfield, Massachusetts, the Hampden County Regional Employment Board (REB) is mandated by Federal job training legislation to work with firms, localities, and educational institutions in the operation of the Workforce Investment Act. When the local machining association faced a shortage of skilled workers as the result of the closing of several large companies that had previously trained apprentices, it approached the REB. The REB brought the firms together with five vocational high schools and two community colleges. The connections between the schools and the companies had been thin and intermittent. With active intervention from the REB, the parties started to work on curriculum development; on training programs for supervisors and for unemployed workers; on organizing career fairs and firm visits to encourage high school students to consider machining jobs; and the gaps began to close.

Risk-reduction and risk-pooling are among the original functions for all forms of insurance and standard setting, and virtually all trade associations develop these functions to a greater or lesser extent for their members. For example, as we traced out the network mentioned above that connects Mass Tank to start-up companies in the New England region, we discovered that Mass Tank itself depends on a trade association, the Steel Tank Institute, for standards, testing, expertise, and insur-

ance. The dangers of leaky tanks create enormous potential hazards—and lawsuits—and no small company on its own could afford adequate insurance from the regular insurance market. By working with the Environmental Protection Agency to develop safety standards, the Steel Tank Institute has been able to offer its members technology, testing, and insurance that covers them.

These very old uses of association for risk-pooling today are being put to new purposes in harnessing them to innovation and to commercializing innovation in the United States. The first of the National Manufacturing Innovation Institutes, the National Additive Manufacturing Innovation Institute (NAMII) in Youngstown, Ohio, offers companies, universities, and Government agencies a way to distribute the risks of investing in new technologies while still deriving many of the potential benefits. As one industrial partner from a metal-working company expressed his perception of the risks: “We don’t make plastic toys, so we couldn’t justify investing in-house in a technology like this that may just be a flash in the pan. But just suppose it does work out and we’re not close enough to it to have a voice in shaping its development . . . what then?” For those firms that do already have proprietary stakes in additive manufacturing there are yet other risks, and some forms of association with NAMII can help protect against them. For a region like Northeast Ohio and Southwest Pennsylvania, there’s the enormous promise of technologies that could revitalize many of the small- and medium-sized manufacturers but no way of finding a single industrial champion that would have an interest in carrying the project. The gains from 3-D printing, if it ever succeeds in overcoming its many current limitations, would be harvested by a multiplicity of users across diverse industrial sectors. When gains from innovation are significant but distributed thinly across many firms, it’s unlikely that any single one of them will invest enough to bring it to life. NAMII offers potential ways to induce collaboration and spread its risks that could bring a new technology to life and inject new vitality into the regional economy.

The cases we have described as exemplifying new approaches to rebuilding the industrial landscape are so new that we cannot know if any one of them will ultimately work or not. If we believe, nonetheless, that they have a real chance, it’s because what’s held manufacturing in the United States in the last resort—even as so much turned against it—was the advantage firms gain from proximity to innovation and proximity to sophisticated users. Even in a world linked by big data and instant messaging, the gains from colocation have not disappeared. If we can learn from these ongoing experiments in linking innovation to production, new streams of growth can flow out of industrial America.

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#### PREPARED STATEMENT OF LEO HINDERY, JR.

CHAIRMAN, SMART GLOBALIZATION INITIATIVE, NEW AMERICA FOUNDATION

DECEMBER 11, 2013

#### The Manufacturing Imperative

The importance of the manufacturing sector to America and the American economy is, to most policy makers and economists, hard to dispute, yet over just the past 12 years U.S. manufacturers have cut 30-plus percent of their workforce, or more than 6 million workers. The manufacturing sector’s contribution to GDP has fallen to around 12 percent from nearly 23 percent in 1970.<sup>1 2</sup>

In a compelling statement in defense of the importance of manufacturing to domestic job creation and maintaining America’s competitiveness and national security, Rich Harshman, President and CEO of Allegheny Technologies Inc., wrote: “You can’t just have a service sector as the underpinning of a successful, diverse, and globally competitive economy. The type of economic diversification that can support a middle class and meet our international obligations mandates that the U.S. be a successful manufacturer.”<sup>3</sup>

The attributes and implications of the manufacturing sector are compelling:

1. *Largest multiplier effect.* Manufacturing has by far the largest employment multiplier of all sectors of the economy, at least three times that of any service sector, including the hallowed financial services sector.

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<sup>1</sup> “A Reality Check on American Manufacturing”, *Bloomberg Businessweek*, September 10–16, 2012.

<sup>2</sup> Table B-1, et al., of the August 2012 BLS Employment News Release, <http://www.bls.gov/news.release/pdf/empisit.pdf>.

<sup>3</sup> “Made in America” special advertising section, *Bloomberg Businessweek*, September 10–16, 2012.

2. *Productivity powerhouse.* Manufacturing productivity growth is consistently 60 percent greater than in the private, nonfarm economy as a whole.
3. *Better wages and benefits.* Manufacturing employees earn, on average, 23 percent more than workers in other parts of the economy.
4. *Source of innovation.* Manufacturers are responsible for more than 70 percent of all business R&D.
5. *Diversified employment.* And ethically, manufacturing employs workers at all skill and educational levels and reduces income inequality.

Yet even as we meet here today, the meager real economic recovery which we are experiencing has, in relative terms, substantially further disadvantaged production and nonsupervisory workers.<sup>4</sup>

#### **Size of the Manufacturing Sector**

What we have consistently failed to do in America since about 1980 is appropriately “size”, so to speak, the sector.

Right now, the U.S. manufacturing sector employs about 12 million workers, or just 8 percent of the U.S. civilian labor force. However, work we’ve done shows that the sector needs to represent more on the order of 20 percent of total U.S. employment, otherwise periodic consumer-credit driven bubbles will continue to plague our economy while concurrently we will never bring to bay our several hundred billion dollar a year trade deficit in manufactured goods.

It’s actually far more important that policy makers focus on our manufactured goods trade deficit, with its myriad adverse economic, social and defense implications, than on the more nuanced Federal budget deficit. In fact, it’s almost impossible to fix the budget debt without fixing the trade deficit.<sup>5</sup> Because, when you try to do that as we have for the last 3 years, the results of the austerity on jobs and the economy, especially for hard working lower-income Americans, has been devastating.<sup>6</sup> And we know, verifiably, that eliminating the trade gap in manufactured goods can be achieved without materially reducing Americans’ standard of living.<sup>7</sup>

#### **A National Manufacturing Policy**

Perhaps the primary reason for America’s dramatic decline in manufacturing is that unlike every one of its large trade competitors, the U.S. does not have an articulated all-of-government national manufacturing policy. U.S. Government policies related to access to financing, R&D and investment tax credits, taxes, foreign subsidies, and domestic procurement must be integrated into a dynamic cohesive strategy. Mandating the U.S. Government develop a coherent strategy is an idea that has been proposed by a number of members of Congress and the Senate, and it’s something that is long overdue.<sup>8</sup>

In considering a national manufacturing strategy, it is not simply enough to identify what the U.S. should be doing. Countries like Singapore, China, and others already prepare their own national economic strategies, where they indicate certain preferred sectors into which they deploy significant subsidies to build at home and attract companies from abroad. The U.S. should not turn a blind eye to foreign country’s economic strategies, and rather should make a defensive economic strategy a key part of any national manufacturing strategy. This defensive strategy should focus on identifying key subsidies and unfair trade practices, like discriminatory technology standards, being used to build up local industries to the detriment of U.S. businesses and workers. And our trade enforcement agencies should get serious about forcing the disclosure of the subsidies and unfair trade practices and bring cases to stop them.<sup>9</sup>

#### **Access to Financing**

While commercial bank lending to the Nation’s large multinational manufacturers is fairly robust, more than a quarter of the small- and medium-sized manufacturers (or SMEs) still cite “lack of capital to grow” as their biggest challenge, precisely at

<sup>4</sup>Ben Casselman, “Job Gap Widens in Uneven Recovery”, *Wall Street Journal*, November 11, 2013.

<sup>5</sup>Joseph Stiglitz, “Making Globalization Work”, 2006, pp. 245–68.

<sup>6</sup>Paul Krugman, “The Mutilated Economy”, *New York Times*, November 7, 2013.

<sup>7</sup>Michael Mandel and Diana G. Carew, “Manufacturing in the App Economy: How Many Jobs Should We Aim For?” Progressive Policy Institute, May 2012.

<sup>8</sup>See, S.1709 Coons-Kirk bill on the subject, cosponsored by Sherrod Brown, at <http://www.coons.senate.gov/newsroom/releases/release/senators-coons-kirk-introducebipartisan-bill-to-create-a-national-manufacturing-strategy>.

<sup>9</sup>See, S.355, Merkley-Enzi bill to require USTR to do a counternotification of subsidies for any country 2 years in a row that does not meet its WTO requirements to notify on subsidies.

the time they need loans to hire more workers, buy new equipment and aggressively market themselves.

The banks' expressed reservation, as if out of the movie "Casablanca", is that these SMEs are "too dependent on short-term contract work",<sup>10</sup> which of course is what largely defines most manufacturing SMEs.

Part of the problem is our largest national banks' focus on short-term financialism and the attractiveness to them of generating revenues through secondary-market trading rather than from primary market capital raising and on-the-ground lending. The Dodd-Frank Act's reforms to ban proprietary trading, if meaningfully implemented, should help reorient the major banks away from betting on the ups and down on markets, and instead focus on raising capital for customers. More should be done as well.

Programs such as the State Small Business Credit Initiative, passed in the 2010 Small Business Jobs Act, also appear to offer a successful, flexible model that the Congress may wish to revisit and expand. States like Michigan have used the 2010 Act to fund collateral support programs, while others have used it to support loan losses by banks, allowing them to make loans that would otherwise not get made.

The U.S. also needs to be more realistic in its approach to public development banks. All of the world's leading industrial Nations—except the United States—have important public development banks, which in the aggregate account for 25 percent of the assets of the world's banking system and 30 percent of the financial assets in the banking system of the European Union.<sup>11</sup>

Specifically to this point, all of the world's leading industrial Nations, except the U.S., have important public development banks: Japan relies on Japan Development Bank; Germany on Kreditanstalt fuer Wiederaufbau (KfW); South Korea on Korea Development Bank; Brazil on Brazil Development Bank (BNDES); Canada on Business Development Bank of Canada; and of course China on China Development Bank. And by not deploying public capital to support manufacturing, the U.S. is putting our businesses at a competitive disadvantage and allowing foreign countries to pull jobs overseas, which is especially the case if the U.S. does not aggressively enforce illegal subsidy cases through WTO and U.S. domestic trade remedy law.

These countries also use their export-import banks far more aggressively than the United States uses its, often notably to make "matching loans" to help offset foreign competition.

Another way to provide this funding is through a "Made in America Bonds" (MABs) program modeled on the Build America Bonds program that was created by the American Recovery and Reinvestment Act of 2009.<sup>12</sup> As proposed by Michael Lind and Daniel Mandel of the New America Foundation, Made in America Bonds would be a new class of tax credit bonds issued by States, local governments, and other authorized entities, especially municipalities, to encourage the establishment and expansion of manufacturing in the United States.

Important aspects of the MAB program should be (a) "employment impact statements" to determine which proposed new manufacturing initiatives are most likely to create and support U.S. jobs and (b) "Made in America" requirements, since no single measure would do more to help resuscitate U.S. manufacturing employment than an all-of-government buy-domestic procurement requirement.

Another aspect of maintaining a level playing field with respect to access to capital relates to State-owned and State-invested enterprises (broadly defined as SOEs) operating on other than commercial considerations. The U.S. needs to establish a legal structure to prevent anticompetitive practices, and to then ensure that when they occur, there are specific legal remedies available.

We of course have laws against unfair trade—most notably the Sherman Antitrust Act passed almost 125 years ago and the Clayton Antitrust Act passed roughly 25 years later. But vis-a-vis the new world of foreign investment by SOEs, especially given China's "go out" strategy designed to promote its SOEs' foreign investments and activities, there is in reality little in current law to adequately ensure that U.S. workers, businesses and investors have a level playing field to compete for the ownership and control of important national economic resources. Compare this to Canada, which recently passed a foreign investment law that allows the Government to review foreign investments in light of their impacts on Canada's national economic strategy.

<sup>10</sup>Parija Kavilanz, "Manufacturers to Banks: We Need Money Now", CNNMoney.

<sup>11</sup>Jose de Luna-Martinez and Carlos Leonardo Vicente, "Global Survey of Development Banks", The World Bank—Policy Research Working Paper 5969, February 2012.

<sup>12</sup>Michael Lind and Daniel Mandel, "Made in America Bonds", New America Foundation, March 22, 2010.

Should a major Chinese or Vietnamese SOE seek to establish operations in the U.S. market directly or through takeovers of U.S. firms, there is now the real risk that such SOE could, given its below-market State-supported cost-of-capital and other behavior, unfairly compete with U.S. businesses, workers, and investors, all without running afoul of our current antitrust laws. It's past time to update our foreign investment laws to ensure a level playing field, and the United Steelworkers have proposed some interesting ideas in their important position paper "Ensuring Competitive Markets."<sup>13</sup>

The 2012 Task Force on Jobs, which I cochaired with USW President, Leo Gerard, also identified three investment incentives that should be made part of any overall access-to-capital initiative, including:

- First, extend and expand Treasury's 1603 Cash Grant Program for manufacturing-centric renewable energy production.
- Second, extend the Advanced Manufacturing Tax Credit (Section 48c) of The American Recovery and Reinvestment Act (ARRA) in order to prompt further investments in qualified advanced energy projects at manufacturing facilities.
- Third, expand the Loan Guarantee Program of Title 17 of the Energy Policy Act of 2005 to include "energy-efficiency" investments.

Permanent R&D and investment tax credits directly linked to job creation would also play an important role in industrial revitalization. Such tax credits would help rehabilitate and renovate existing manufacturing facilities, provide incentives for purchasing new equipment, and jump-start new technologies and process-development.

#### **Tax Reform**

President Obama has said many times that, "It's time to stop rewarding businesses that ship jobs overseas, and start rewarding companies that create jobs right here in America."<sup>14</sup>

Two actions would significantly improve the financing prospects and the global competitiveness of the manufacturing sector:

- First, reduce the corporate tax rate from 35 percent to between 25 and 28 percent while getting rid of the corporate "tax expenditures" that have nothing to do with retaining existing jobs and creating new ones.
- Second, enact a value-added-tax (VAT) to offset the significant tax disadvantages now faced by American corporations on account of the VATs used by most trading partners, but not by the U.S. Right now, in order to attract overseas investment and retain domestic production, our major foreign competitors without exception use a lower corporate income tax combined with a VAT, the result of which is net higher taxes on U.S.-made products sold both at home and abroad.<sup>15</sup>

#### **Building Our Physical Infrastructure**

A key foundation of the manufacturing sector—and a widely recognized public responsibility—is infrastructure. Moving materials and goods—and workers—around the country and to market requires roads, rapid transit, bridges, ports, and airports that serve 21st century needs. Right now, however, the U.S. is sorely underinvesting in infrastructure, and what's especially needed, for manufacturers of all sizes and for the Nation, is a new large National Infrastructure Bank, ideally with the following principle characteristics:

- The Bank should be an independent financial institution owned by the Federal Government with overall capitalization of at least \$1 trillion and with its primary source of leverage being the large State and municipal pension plans.
- As its equity-capital base the Bank should have a soft Federal guarantee equal to about one-tenth of its total capitalization, which, if thoughtfully designed, will not need to be "scored" and thus added to the Federal deficit.
- Using its authorization to make and guarantee loans, leverage private capital, and issue general-purpose bonds, the NIB should be allowed to fund a broad range of infrastructure projects beyond traditional roads, rails, and runways.

<sup>13</sup>United Steelworkers Union, Position Paper: "Ensuring Competitive Markets", June 2013.

<sup>14</sup><http://www.whitehouse.gov/the-press-office/2012/01/24/remarks-president-state-union-address>

<sup>15</sup>Leo Hindery, Jr., and Michael Lind, "America Needs a VAT", *Los Angeles Times*, May 24, 2010.

- Governance should be by an independent, nonpartisan board of (i) executives who are expert in infrastructure, (ii) labor leaders, and (iii) public policy experts.
- Projects in the States and for the local governments whose pension plans participate in capitalizing the Bank should have preference over those of States and local governments which elect not to participate.
- Finally, the Bank should only fund projects which adhere to “buy domestic” (Made in America) requirements that are consistent with the United States’ international trade agreements.

The Defense Production Act, which is up for reauthorization next year, might, if DOD’s understandable concern about quick delivery of time-sensitive goods can be addressed, might serve as a meaningful complement to an all-of-Government National Infrastructure Bank.

One further comment I must add is that maintaining mostly local, public control of our infrastructure is critical. Resuscitating America’s infrastructure cannot become a mechanism for outsourcing control over some of our major rehabilitated roads and bridges and, especially, some of our vital seaports and airports to private investors, whether they’re from Wall Street, Beijing, or Abu Dhabi. Of particular concern, at least to me, is the proposal, yet again being advanced by former Treasury Secretary Bob Rubin, that China’s big banks be given a major role in upgrading our important infrastructure.

### **Building Our Human Infrastructure**

Abundant, pertinent skills are integral to the robustness of a Nation’s manufacturing sector, and skill setting must be part of any national manufacturing policy. Currently, far too many young Americans are growing up without the opportunity to obtain the skills and the interest at young enough ages to develop promising careers in manufacturing.

By the time students get out of middle school, if they’ve not developed sufficient science, technology, engineering, and math skills—i.e., so-called “STEM” skills—it may well be too late for them in the increasingly highly automated world of advanced manufacturing. Yet we know that working with your hands at almost any level is a great way to establish living wage careers in the manufacturing sector.

Many countries use the promise of free education and training for local workforces—and apprenticeship programs<sup>16</sup>—to attract investors to move factories and associated jobs abroad. The U.S. can’t sit idly by without further eroding our global competitiveness.

Expanding STEM education as well as career and technical education—and providing professional development and support for teachers and school leaders to promote high-quality instruction—is critical to restoring the human infrastructure of the U.S.<sup>17</sup> As we are hopefully winding down our involvement with foreign wars, we need to redouble our training efforts here at home as we did in the immediacy of the end of the Second World War.

### **Trade Enforcement**

Any effort aimed at revitalizing manufacturing in America must include fundamental reform of our trading relationships. For example, our annual trade deficit in manufactured goods just with China costs us about \$40 billion in lost<sup>18</sup> wages.

Much has been written about how China has unfairly gained trade advantages through its abysmally low direct-labor costs, low-grade environmental and labor standards and currency manipulation. These same conditions are now drawing American manufacturing jobs to even less developed countries, like Vietnam and Bangladesh. As trade scholars such as Hastings trade law professor Joel Paul have argued for and policy leaders like Subcommittee Chairman Merkley have endorsed, it should be easy to include the cost of both adequate wages and sustainable production methods within the calculation of the cost of production in antidumping duties which should incentivize foreign companies to raise wages, workplace safety, and environmental compliance proactively.<sup>19</sup>

Less appreciated, however, are the variety and magnitude of the other measures China, for example, uses to game the system. Since some of these unfair practices

<sup>16</sup>Nelson D. Schwartz, “Where Factory Apprenticeship Is Latest Model From Germany”, *New York Times*, November 30, 2013.

<sup>17</sup>S.1675, “Preparing Students for Success in the Global Economy Act”, Senator Jeff Merkley, et al.

<sup>18</sup>Economic Policy Institute, September 30, 2013.

<sup>19</sup>Joel Paul, “Fair Wages for Free Trade”, *Huffington Post*, October 10, 2012, [http://www.huffingtonpost.com/joel-richard-paul/fair-wages-for-fair-trade\\_b\\_1944379.html](http://www.huffingtonpost.com/joel-richard-paul/fair-wages-for-fair-trade_b_1944379.html).

are already being adopted by countries such as Brazil and Vietnam, getting right America's trade relationship with China is particularly critical. These so-called "trade advantages" include: China's regulations to block foreign firms from selling their products to Government agencies; technical standards that prevent or hinder the Government and local businesses from buying U.S. goods; and rules that force Western companies to give up technological secrets in exchange for market access.

Of the many possible responses to the persistent trade abuses that are happening in China and elsewhere, six that particularly stand out are as follows:

1. The Administration's focus should not be, as it states, growing gross exports.<sup>20</sup> All that matters is our net exports position, which currently remains massively negative.<sup>21</sup>
2. The next required Semiannual Report on International Economic and Exchange Rate Policies from the Treasury Department must be objective and designate any country as a currency manipulator that meets the standard. Thereafter, the USG needs to go after all of that country's illegal subsidies.
3. The USG should not enter into new investment treaties with countries like China until those countries are fully WTO-compliant. For example, there are still serious questions about China's Indigenous Innovation Production Accreditation (IIPA) Program. In the interim, the USTR should bring a Section 301 case against the IIPA Program.<sup>22</sup>
4. The "one size fits all" premise behind the proposed Trans-Pacific Partnership FTA negotiations—which would include Brunei and New Zealand equally alongside China and Japan—is deeply flawed, both intellectually and economically, and should be revisited.
5. Congress needs to pass a bill similar to the Reciprocal Market Access Act of 2011 (H.R. 1749) and its Senate counterpart (S.1766) which would eliminate the distinction that exists between traditional tariff barriers and the much-larger nontariff barriers that prevent fair market access by American suppliers.<sup>23</sup>
6. Finally, "trade agreement enforcement" should be moved from the U.S. Trade Representative's office to a fully enabled and funded office in the Justice Department. At a minimum, the new Assistant Secretary of Commerce for Enforcement and Compliance should be named the head of the Interagency Trade Enforcement Committee and made independently accountable to Congress for the ITEC's trade enforcement agenda. A top-to-bottom review of the USG's trade enforcement capabilities, including budgetary, should be initiated.

### Conclusion

Getting our manufacturing policy right means taking actions both here and abroad. We have to adopt a national manufacturing policy, build our physical and human infrastructure, close tax loopholes that drive manufacturing abroad, and fight for a level playing field in international trade. Although the Obama administration has made some progress, the United States is still tolerating far too many selfish, shortsighted behaviors that are hurting the middle class and its workers, creating a large and unsustainable trade imbalance in manufactured goods, and crippling our economic vitality and national security.

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## PREPARED STATEMENT OF DEREK SCISSIONS

RESIDENT SCHOLAR, AMERICAN ENTERPRISE INSTITUTE

DECEMBER 11, 2013

Large economies should always get their own house in order first. American private wealth is by far the world's highest, on the order of \$45 trillion ahead of Ja-

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<sup>20</sup> August 4, 2010, letter to President Barack Obama by Senators Sherrod Brown (D-OH), Olympia J. Snowe (R-ME), Charles E. Schumer (D-NY), Debbie Stabenow (D-MI), Jim Bunning (R-KY), Arlen Specter (D-PA), Susan M. Collins (R-ME), Ron Wyden (D-OR), Benjamin L. Cardin (D-MD), Robert P. Casey, Jr. (D-PA), and Carl Levin (D-MI).

<sup>21</sup> Leo Hindery, Jr., "U.S.—China: How Long China's Doormat?" *Huffington Post*, August 24, 2010.

<sup>22</sup> Leo Hindery, Jr., "China Trade: A 'Target Rich Environment' ", *Huffington Post*, March 20, 2012.

<sup>23</sup> *Ibid.*

pan's and China's.<sup>1</sup> This staggering achievement has been due overwhelmingly to American policies, not foreign. The challenges facing the U.S. economy, and manufacturing in particular, can and should be addressed primarily by American policy.

As a secondary matter, manufacturing is now a global activity and foreign actions play a role. Among the many global factors, the single most important is Chinese subsidies. The People's Republic of China's (PRC) manufacturing sector is the only one of comparable size to the U.S. It is driven by Government intervention, rather than genuine commercial competition, and this intervention harms American manufacturing companies and workers.

The harm is usually identified as large-scale U.S. imports from China. In fact, the main problems are barriers to American exports to the PRC and, perhaps soon, a growing battle in third markets. For the last decade, Beijing has acted as if competition is good for everyone except Chinese firms on their home turf.

The best American policy does not, and indeed is unable to, imitate the PRC's anticompetitive actions. Instead, the U.S. should document Chinese regulatory and financial subsidies, then take a sequence of steps—multilateral, bilateral and, if ultimately necessary, unilateral—to reduce them. The PRC will remain a competitor regardless of whether its new Government returns the country to the path of market-driven reform. But wise choices by the U.S. could help move China further from an unpleasant challenge to American manufacturing and closer to the intriguing opportunity many hope for.

### **Barriers to Competition**

Competition is the foundation of economic prosperity. It cuts prices, raises quality, and drives innovation. Even limited competition offers considerable benefits along these lines. For an economy as a whole, whether a national economy or the world economy, the more competition the better. Conversely, anticompetitive behavior by companies or Governments is always harmful to the economy as a whole.

Monopolization is the most basic form of anticompetitive behavior. Monopolies can extend over specific goods or services or a specific region. Monopolies don't innovate, and the quality of their goods and services is generally substandard due to lack of incentive to improve.<sup>2</sup> Very close to outright monopolization is guaranteed market shares. Here, there is more than one firm but some or all participants are guaranteed business. If any portion of such industries is competitive, it is only a slice.

The second main form of undermining competition is through prices. These can be sales prices, of course, but there are also a number of input prices that can be manipulated. Wages (the price of labor) can be distorted, as can borrowing costs (the price of capital), the price of land, power, water, telecom services, and so on. A determined and effective Government has many tools to limit competition.

These and other tools are all subsidies. There are always individuals or firms who benefit from limited competition. They may receive outright regulatory protection, such as a guaranteed market share. They may receive Government transfers to offset their labor costs. They may be able to borrow at low prices, or receive free land or power. Subsidies can be financial in nature, but they do not have to be. Indeed, regulatory protection is more fundamental.

### **Regulatory Protection**

The PRC has legitimate and sizable comparative advantages. It has a solidly capable labor force with wage rates that are still relatively low compared to many of its peers. It now has plenty of capital. And China is hardly the only country in the world to engage in large-scale subsidies. The U.S., for one, has subsidized some farm goods despite being the world's biggest agriculture surplus country. It is in the size, range, and effectiveness of its subsidies that the PRC is unmatched.

For a set of major industries, the principal subsidy is regulatory shelter from competition. By central Government decree, the State is required to control these industries to various extents. At the top of the list, where the State must have "absolute" control, are armaments, aviation, coal, oil and petrochemicals, power generation and distribution, shipping, and telecom. The State should also lead in autos, construction, IT, machinery, and metals.<sup>3</sup> Though it is not formalized, State entities also control nearly all of insurance, media, railways, and some smaller sectors.

<sup>1</sup>Credit Suisse, "Global Wealth Report 2013", October, 2013, <https://publications.credit-suisse.com/tasks/render/file/?fileID=BCDB1364-A105-0560-1332EC9100FF5C83>

<sup>2</sup>"We're the Phone Company: We Don't Care, We Don't Have To", *Saturday Night Live* via *Stop the Cap*, <http://stopthecap.com/2012/08/23/were-the-phone-company-we-dont-care-we-dont-have-to/>

<sup>3</sup>Zhao Huanxin, "China Names Key Industries for Absolute State Control", *China Daily*, December 19, 2006, [http://www.chinadaily.com.cn/china/2006-12/19/content\\_762056.htm](http://www.chinadaily.com.cn/china/2006-12/19/content_762056.htm)

In addition, there are ongoing consolidation efforts, to address what Beijing calls “disorderly” competition.<sup>4</sup> The solution is to contract the total number of firms, while increasing the combined market share of remaining State-owned enterprises (SOE’s).<sup>5</sup>

Nonstate firms have not been able to enter any of these industries, nor could nonstate firms already in the industry succeed beyond a certain, unspecified point. In contrast, SOE’s can only fail to the extent of being absorbed by other SOE’s, the State share as a whole is not permitted to shrink. Such SOE’s have no final obligation to ostensible creditors and certainly cannot go bankrupt. For these sectors and companies, nothing else matters—wages, borrowing, land are all details when success is essentially guaranteed for some and barred for others.<sup>6</sup>

Alternative energy and energy conservation	Materials
Autos	Media
Aviation	Metals
Banking	Oil and gas
Biologic science	Petrochemicals
Coal	Power
Construction	Railways
Environmental protection	Securities
Information technology	Shipping
Insurance	Telecom
Machinery	Tobacco

Beijing’s mandates are exacerbated by analogous provincial goals. Provincial leaders listen to the central Government when they want to and when they absolutely have to. That is: not all the time.<sup>7</sup> Unfortunately, the provinces are almost always pleased to accept the demand for State dominance of major industries. They typi-

<sup>4</sup> Liu Jin, “Construction Machinery Industry on the Road to Recovery”, *China Economic Net*, May 16, 2013, [http://en.ce.cn/Insight/201305/16/t20130516\\_24390213.shtml](http://en.ce.cn/Insight/201305/16/t20130516_24390213.shtml)

<sup>5</sup> For instance in autos, see: Han Tianyang, “Another Call for Consolidation”, *China Daily*, January 28, 2013, [http://www.chinadaily.com.cn/indy/2013-01/28/content\\_16178732.htm](http://www.chinadaily.com.cn/indy/2013-01/28/content_16178732.htm)

<sup>6</sup> Zhao Huanxin, op cit.; Zhang Xiang, ed., “China To Nurture 7 New Strategic Industries in 2011–2015”, *Xinhua*, October 27, 2010, [http://news.xinhuanet.com/english2010/china/2010-10/27/c\\_13578293.htm](http://news.xinhuanet.com/english2010/china/2010-10/27/c_13578293.htm); Central Huijin Investment Ltd., “Investments”, [http://www.huijin-inv.cn/hjen/investments/investments\\_2008.html?var1=Investments](http://www.huijin-inv.cn/hjen/investments/investments_2008.html?var1=Investments); Grant Turner, Nicholas Tan, and Dena Sadeghian, “The Chinese Banking System”, Reserve Bank of Australia, September 2012: 53–64 <http://www.rba.gov.au/publications/bulletin/2012/sep/pdf/bu-0912-7.pdf>; Mu Xuequan, ed., “China Launches New State-Owned Railway Corporation”, *Xinhua*, March 14, 2013, [http://news.xinhuanet.com/english/china/2013-03/14/c\\_132234204.htm](http://news.xinhuanet.com/english/china/2013-03/14/c_132234204.htm); Chinese Government, “State Tobacco Monopoly Administration”, news release, [http://english.gov.cn/2005-10/03/content\\_74295.htm](http://english.gov.cn/2005-10/03/content_74295.htm); and Towers Watson, *The Chinese Insurance Market*, No. 19 (Shanghai, China, March 2012), <http://www.towerswatson.com/en/Insights/Newsletters/Asia-Pacific/The%20Chinese%20Insurance%20Market%20Newsletter%2012012/The-Chinese-Insurance-Market-Newsletter-No19>.

<sup>7</sup> See, for example, Yongheng Deng, et al., “Incentives and Outcomes: China’s Environmental Policy”, National Bureau of Economic Research, February 2013, <http://www.ires.nus.edu.sg/workingpapers/IRE2013-004.pdf>.

cally want more, to add sectors such as agriculture and environmental protection to the monopoly list.<sup>8</sup>

Alternately, they want their SOE's to be the major players in the industries set aside by Beijing. Of course, this breeds a sort of competition, political—it is always someone else who should close down excess capacity. This is far from healthy—immense amounts of resources are wasted as provinces seek to best each other in the battle of subsidies. Perhaps the most perverse example is in shipping, where State regulatory protection and provincial competition have kept 1,500 shipyards open, even though fewer than 100 have won orders in the past year.<sup>9</sup>

### Financial Subsidies

On top of all this, the single most important area of control for the State is banks, both national and local. Competition in banking is suppressed—there is exactly one large domestic private bank and the foreign share of banking assets is under 2 percent and still managing to fall.<sup>10</sup> Not only is banking itself tightly controlled, the control gives the State a gigantic lever to influence the rest of the economy.

State banks lend for political not commercial reasons, as dramatically demonstrated by the surge in lending in 2009 as the global crisis struck home and profit opportunities disappeared. They loan overwhelmingly to State firms, with estimates of the State share still in excess of 80 percent of formal borrowing from all sources.<sup>11</sup> Interest rates on these loans are often less than producer inflation, so that the real cost of borrowing is negative. When loan payments actually bite, most State firms have the option not to repay.<sup>12</sup>

Not all SOE's are deemed worthy of an endless supply of credit but most are, at least for some periods. These range from industries targeted for expansion, such as green energy, to those losing vast amounts of money and targeted for consolidation, such as parts of the food industry.<sup>13</sup> Many unsuccessful SOE's receive a seemingly permanent bailout. The subsidies are enormously wasteful and have led to daunting debt problems.<sup>14</sup> Nonetheless, it is naturally quite difficult to compete with any firms getting so much nearly free capital.

A proper estimate of the size of the subsidy would involve a great deal of work, especially given lack of financial and corporate transparency. At the end of 2012, the People's Bank reported outstanding loan volume of \$12.93 trillion.<sup>15</sup> On the order of \$10.3 trillion was loaned to SOE's and almost all of that on noncommercial terms—at near-zero costs or with optional repayment. This certainly does not constitute a \$10 trillion subsidy, since there would be a large amount of lending under a commercial banking system. But the amount of capital affected by Chinese subsidies and used by SOE's is approximately \$10 trillion.

About half of this has been rung up since 2009, thanks to the loan spike after the crisis. While a rigged banking system is not a guarantee of success the way regulatory protection is, the quantity of money involved qualifies as a powerful distortion of competition. Domestic bonds and stock markets are also heavily biased to

<sup>8</sup> Alan Chu, "China by the Numbers: Understanding China's Provincial Priorities", PwC LLP, <http://www.pwc.com/us/en/view/issue-13/understanding-chinas-provincial-priorities.jhtml>.

<sup>9</sup> Keith Wallis, "Orders Climb at China's Shipyards, But Rebound Favours a Few", Reuters, September 18, 2013, <http://www.reuters.com/article/2013/09/18/china-shipyards-idUSLANOGLDLS20130918>.

<sup>10</sup> Wang Zhaoxing, "Integration of Foreign Banks", *China Daily: Europe*, June, 2, 2012, [http://europe.chinadaily.com.cn/business/2012-06/02/content\\_15456078.htm](http://europe.chinadaily.com.cn/business/2012-06/02/content_15456078.htm).

<sup>11</sup> Wing Thy Woo, "China Meets the Middle-Income Trap: The Large Potholes in the Road to Catching-Up", *Journal of Chinese Economic and Business Studies*, Volume 10, Issue 4, 2012, <http://www.tandfonline.com/doi/abs/10.1080/14765284.2012.724980#preview> and "State Capitalism's Global Reach: New Masters of the Universe", *The Economist*, January, 21, 2012, <http://www.economist.com/node/21542925>.

<sup>12</sup> Zhou Xiaochuan: Real Interest Rate To Stay Negative for Now", *China.org.cn*, March, 14, 2011, [http://www.china.org.cn/china/NPC\\_CPPCC\\_2011/2011-03/14/content\\_22133432.htm](http://www.china.org.cn/china/NPC_CPPCC_2011/2011-03/14/content_22133432.htm).

<sup>13</sup> "Chinese Zombies Emerging After Years of Solar Subsidies", *Bloomberg News*, September 9, 2013, <http://www.bloomberg.com/news/2013-09-08/chinese-zombies-emerging-after-years-of-solar-subsidies.html> and Adam Jourdan, "China Milk Makers Including Yili, Mengniu To Get State Support", Reuters, September 22, 2013, <http://www.reuters.com/article/2013/09/22/us-china-dairy-idUSBRE98L03F20130922>.

<sup>14</sup> Liyan Qi and Grace Zhu, "Researcher Puts China's Local Government Debt at \$3.3 Trillion", *Wall Street Journal*, September 17, 2013, <http://online.wsj.com/article/SB10001424127887324665604579080683134844374.html> and Xinhua, "Corporate Debt Reaches 'Alarming Levels'", *China Daily*, May 18, 2012, [http://www.chinadaily.com.cn/business/2012-05/18/content\\_15328186.htm](http://www.chinadaily.com.cn/business/2012-05/18/content_15328186.htm).

<sup>15</sup> All loan data taken from National Bureau of Statistics, China Monthly Statistics, Beijing PRC.

ward SOE's, further inflating their access to capital.<sup>16</sup> (This is a considerable problem for the Chinese economy, but less important as a subsidy than loans.)

A new group of Chinese Communist Party leaders was named in fall 2012, a new Government took over in March of this year. As a result, the fall 2013 Party plenary meetings provided a real opportunity for fresh economic reform, the first such opportunity in a decade.

This is a potentially vital development, but the success and direction of reform are open questions. Pro-competition reforms—the ones the U.S. is interested in—are strongly opposed by some elements of the Party, both nationally and locally. In addition, Beijing has a full menu of items competing for high-level attention—including corruption, pollution, and an aging population—and internal disagreement over priorities.<sup>17</sup> Even progressive steps such as the promised modification of the one-child policy do not enhance economic competition. For the next 5 years, at the very least, Chinese subsidies will be a major problem.

### Immediate Impacts

Chronicling the full impact of Chinese subsidies would require multiple books. At one level, Chinese subsidies drive national imbalances and contribute prominently to global imbalances.<sup>18</sup>

Subsidies do not appear from thin air, someone always pays for them. In the PRC, it is consumers and savers. Consumers pay because State monopolies charge higher prices and offer lower quality. Savers pay because interest rates on deposits lag inflation so that banks can afford to hand money to SOE's. These implicit taxes on savings and consumption are transferred to producers and borrowers.

The obvious result is not enough consumption and too much investment, a decade-long phenomenon that is now driving Xi Jinping's China toward an investment-consumption imbalance reminiscent of Mao Zedong's China. The PRC's large trade and other external surpluses arise from this imbalance and are a destabilizing factor globally.

At the corporate level, subsidies mean that all foreign and private Chinese companies face an unbalanced fight when competing with SOE's in China or other markets. Focusing on American firms, the unbalanced competition is embodied in American imports, American exports to China, and in third markets.

A disproportionate amount of attention, some of it misguided, has been paid to unbalanced competition from imports. Chinese subsidies certainly affect American imports. Measuring this through the bilateral trade imbalance is unwise, however, since it reflects neither value added nor the new phenomenon of Chinese production moving off-shore.<sup>19</sup> More important, even while some American producers suffer, most American consumers benefit from Chinese subsidies in the form of lower producers.

The same cannot be said for American exports. There, Chinese subsidies do nothing than deny sales to American firms and workers. The demand for State dominance leads to regulatory barriers that ensure that exports of American goods and services can claim only a tightly limited share of the market in banking and many other sectors. The same is true for firms operating within the PRC, especially in oil and gas. Financial subsidies cap American exports of environmental technology and other areas of U.S. comparative advantage.

The blocking of American exports is well-established and by far the worst problem but a new area of difficulty is Sino-American competition in third markets. Guaranteed revenue at home from regulatory protection and financial subsidies targeted at

<sup>16</sup>Pierre Pessarossi and Laurent Weill, "Choice of Corporate Debt in China: The Role of State Ownership", *China Economic Review*, Volume 26, September 2013, pp. 1–16, <http://www.sciencedirect.com/science/article/pii/S1043951X13000242> and Henk Berkman, Rebel A. Cole, and Lawrence J. Fu, "Improving Corporate Governance Where the State Is the Controlling Block Holder: Evidence From China", *The European Journal of Finance*, June 13, 2012, pp. 1–26, <http://www.tandfonline.com/doi/abs/10.1080/1351847X.2012.671784#.UkGqRoashcY>.

<sup>17</sup>Derek Scissors, "The U.S. Should Be Wary of Fake Chinese Economic Reform", The Heritage Foundation, August 12, 2013, <http://www.heritage.org/research/reports/2013/08/us-should-be-wary-of-fake-chinese-economic-reform>.

<sup>18</sup>Derek Scissors, "The Facts About China's Currency, Chinese Subsidies, and American Jobs", The Heritage Foundation, October 4, 2011, <http://www.heritage.org/research/reports/2011/10/the-facts-about-chinas-currency-chinese-subsidies-and-american-jobs>.

<sup>19</sup>Robert Johnson and Guillermo Noguera, "The Value-Added Content of Trade", VoxEU.org, June 7, 2011, <http://www.voxeu.org/article/value-added-content-trade-new-insights-us-china-imbalance>.

overseas expansion make Chinese firms artificially competitive outside the PRC, too.<sup>20</sup>

Not surprising, the main areas for financing are what are labeled strategic industries such as power, transport, and telecom.<sup>21</sup> The Heritage Foundation's China Global Investment Tracker puts Chinese overseas investments from January 2005 through June 2013 at \$430 billion. Though their share is slowly declining, SOE's still account for slightly over 90 percent of this.<sup>22</sup> That's another \$400 billion in corporate spending that is heavily subsidized. It does not measure up to the amount of spending subsidized at home but it is directly and increasingly salient to American companies and workers trying to compete with Chinese in foreign markets.

### The American Response

It is extremely unwise to enter into a subsidies battle with the People's Republic of China. Beijing has myriad ways to intervene in the market, starting with simply telling companies and banks what to do. In 2009, President Obama was frustrated that American banks were not lending more.<sup>23</sup> Chinese banks, meanwhile, were following orders and expanding lending 34 percent. State ownership is the ultimate trump card for subsidies.

Rather than having subsidies envy, the President and Congress should be thankful for their limited authority. American corporate balance sheets have been returning to normal while Chinese corporate debt is worst among major economies.<sup>24</sup> The PRC has doubled local government debt while seeing macroeconomic indicators deteriorate.<sup>25</sup> Chinese subsidies without question hurt individual American companies, but they harm the entire Chinese economy. Promoting competition, not sinking to China's level, is by far America's best response.

The obvious first step is negotiation. This has failed to now. The Strategic and Economic Dialogue (S&ED) is a sensible idea that, for 8 years running, has yielded precious little in the way of results. The latest hope for better Sino-American economic relations is renewed talks on a Bilateral Investment Treaty (BIT). But a BIT has only limited scope to deal with internal Chinese policies—at most it will create a few new hurdles to subsidization which can be easily overcome if Beijing desires.

What matters is not the acronym governing talks but the nature of the Chinese Government. A pro-market Chinese Government will act on its own to enhance competition to some extent. In turn, the U.S. should have a very small number of priorities in negotiations, with reducing regulatory protection first in line. A long list of American demands on scattered issues, formulated to satisfy interest groups here, will continue to be ignored. The U.S. should compile a comprehensive measurement of subsidies to enable concrete bargaining and, more important, objectively measure progress over time. The U.S. should also be ready to offer something of value in return, such as a faster, clearer review process for Chinese investors here.<sup>26</sup>

In contrast, it has proven to be a waste of time to merely negotiate with a pro-State Chinese Government. Such a Government, such as the one which just left office, will only reduce subsidies if pushed hard, which will require considerable time and effort.

<sup>20</sup>For an illustration, see *Japan External Trade Organization—Institute of Developing Economies*, “China in Africa: The Role of China's Financial Institutions”, October 2009, at [http://www.ide.go.jp/English/Data/Africa\\_file/Manualreport/cia\\_11.html](http://www.ide.go.jp/English/Data/Africa_file/Manualreport/cia_11.html) (September 27, 2011).

<sup>21</sup>Cyrus Lee, “ZTE Receives \$20B Loan From China Development Bank”, ZDNet, December 5, 2012, <http://www.zdnet.com/cn/zte-receives-20b-loan-from-china-development-bank-7000008321/>. For an overview, see “China's Superbank: Debt, Oil and Influence—How China Development Bank Is Rewriting the Rules of Finance”, by Henry Sanderson and Michael Forsythe.

<sup>22</sup>Derek Scissors, “China's Steady Global Investment: American Choices”, The Heritage Foundation, July 16, 2013, <http://www.heritage.org/research/reports/2013/07/china-s-steady-global-investment-american-choices>.

<sup>23</sup>Helene Cooper and Eric Dash, “Obama Presses Biggest Banks To Lend More”, *New York Times*, December 14, 2009, [http://www.nytimes.com/2009/12/15/business/economy/15obama.html?\\_r=0](http://www.nytimes.com/2009/12/15/business/economy/15obama.html?_r=0).

<sup>24</sup>Federal Reserve Board, “Financial Accounts of the United States”, Table B.102: Balance Sheet of Nonfinancial Corporate Business, September 25, 2013, at <http://www.federalreserve.gov/releases/z1/current/accessible/b102.htm> versus Xinhua, “Corporate Debt Reaches ‘Alarming Level’”, China.org.cn, May 18, 2012, at [http://www.china.org.cn/business/2012-05/18/content\\_25416137.htm](http://www.china.org.cn/business/2012-05/18/content_25416137.htm).

<sup>25</sup>Liyan Qi and Grace Zhu, “Researcher Puts China's Local Government Debt at \$3.3 Trillion”, *The Wall Street Journal*, September 17, 2013, <http://online.wsj.com/article/SB10001424127887324665604579080683134844374.html>.

<sup>26</sup>Derek Scissors, “A Better Committee on Foreign Investment in the United States”, The Heritage Foundation, January 28, 2013, <http://www.heritage.org/research/reports/2013/01/enhancing-the-committee-on-foreign-investment-in-the-united-states-cfius>.

The first step in this case is also a needed action with a Chinese Government positively disposed to reform. Though it is dull politically, the U.S. must periodically identify and measure Chinese subsidies, including regulatory protection.

Measuring the subsidy provided by protection against competition will be difficult and controversial. If it is not done, though, subsidies will be seriously underestimated and considerable harm will continue to be inflicted on American companies and workers, as well as the Chinese and global economies. Including regulatory protection along with capital and other subsidies means that initial estimates will be inexact, but they will improve over time. And measuring subsidies will enable important actions.

A fairly exhaustive measure of Chinese subsidies may somewhat improve bilateral negotiations, or at least clarify their status. Another route is through the WTO. The U.S. has asked for Chinese documentation of subsidies via the WTO but this has accomplished almost nothing, in part because the American inquiry was based on too little information.<sup>27</sup>

Last, if renewed and better informed bilateral and multilateral approaches fail, a rigorous measurement of subsidies is necessary to determine the best unilateral actions. Otherwise American policy risks being ill-targeted or even, if seen as unjustified protectionism, counterproductive.

#### **Pushing China Toward Genuine Competition**

In sum,

1. The U.S. should not engage in competitive subsidization against the PRC. This will waste hundreds of billions of dollars and achieve almost nothing.
2. The United States Trade Representative (USTR), with assistance from the Department of the Treasury, Department of Commerce, and International Trade Commission, should immediately begin the process of measuring Chinese subsidies, featuring regulatory protection and noncommercial loans.
3. The Department of the Treasury, with assistance from the USTR, should make the economic segment of the 2014 S&ED primarily about subsidies.
4. Failing identifiable progress at the S&ED, the USTR should petition the WTO regarding China's failure to disclose the subsidies documented in the USTR-led effort.
5. If these steps fail to change Chinese policy, the U.S. should use the subsidies measurements to inform unilateral actions.

Chinese subsidies are certainly not the biggest challenge for American companies and workers. But they are the biggest international challenge. As a first step, the U.S. can do a far better job of the information gathering and economic diplomacy that can reduce what is become a global threat to the health of American manufacturing.

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#### **PREPARED STATEMENT OF JULIE SKIRVIN**

GENERAL COUNSEL, OREGON IRON WORKS

DECEMBER 11, 2013

Mr. Chairman and Members of the Committee, thank you for the opportunity to testify today. My name is Julie Skirvin, and I am General Counsel of Oregon Iron Works, a small business headquartered in Clackamas, Oregon. Oregon Iron manufactures structural steel parts for bridges, commercial buildings, and dams. We build silos to house the interceptor missiles that protect our country from attack, renewable energy devices, containers to store nuclear waste safely, marine vessels, rocket launch platforms, and sophisticated metal processing equipment. Oregon Iron, together with its subsidiaries, employs over 450 workers at living-wage jobs in Oregon, Washington, and Pennsylvania.

One of our company's newest product lines is streetcars. When Oregon Iron created our subsidiary United Streetcar in 2005, it had been over 60 years since an American company had built a modern streetcar. I am pleased to report that after years of hard work, Oregon Iron and United Streetcar are now completing modern streetcars at a rate of 1 every 6 weeks. We have delivered seven cars this year to customers in Portland, Oregon, and Tucson, Arizona.

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<sup>27</sup> Office of the United States Trade Representative, Executive Office of the President, "United States Details China and India Subsidy Programs in Submission to WTO", October 2011, <http://www.ustr.gov/about-us/press-office/press-releases/2011/october/united-states-details-china-and-india-subsidy-prog>.

During the Great Recession our streetcar business provided work for 100 people earning family wages with good benefits at our Clackamas facilities. To support our streetcar production we purchased parts and materials from 350 U.S. companies in 32 States. In Oregon alone, we sourced materials from 140 local businesses.

I am honored to appear today before the Committee to address your questions about the role of manufacturing in the U.S. economy, challenges U.S. manufacturers face, and how we can strengthen this important sector. Drawing on Oregon Iron's recent experience launching a streetcar business, as well as my work for 10 years in the manufacturing sector, I welcome this chance to share my perspective.

### **The Role of Manufacturing in Creating a Solid Middle Class**

The leaders at Oregon Iron believe that American manufacturers create the kind of good, middle-class jobs that are essential to a strong United States economy. The Great Recession was hard on our sector, but we are coming back. The Oregonian reported that between 2008–2010, Clackamas County lost more than 3,500 manufacturing jobs. Since the first quarter of 2010, however, one in three jobs gained has been in manufacturing. Fabricated-metal manufacturing saw a gain of more than 700 jobs.

Unemployment in Oregon remains high, at 7.7 percent. Even with a job, workers in the service sector may not earn enough to meet a family's basic needs. In contrast, a skilled machinist can earn well over \$50,000 per year. Manufacturing jobs pay good wages that support strong, stable families.

### **Challenges and Opportunities Facing the U.S. Manufacturing Sector**

Below are some of the policy steps that I believe would invigorate the U.S. manufacturing sector.

#### *1. Ensuring a Supply of Skilled Workers*

Oregon Iron and other manufacturers need access to skilled, work-ready employees. Many young workers entering the manufacturing environment do not possess the skills and training necessary to be successful. While skilled workers are crucial for a business like ours, it can be difficult for small businesses to invest in training without an imminent project. At times, our company has had difficulty finding applicants who have a solid grasp of shop math, possess hands-on experience, and can pass a drug test.

I believe our public education system should place more emphasis on technical training for high school students. There are some stellar technical training programs in our area, including the Clackamas Academy for Industrial Sciences and Sabin-Schellenberg High School, but too many schools, and too many public officials, downplay the value of technical training. We need to ensure these programs receive the funding and respect that they deserve.

The community college system and local workforce training centers also play a key role in helping manufacturers identify and train workers who can thrive in this environment. Oregon Iron is currently in conversations with Clackamas Community College and the Workforce Investment Council of Clackamas County to identify potential new hires and to help our current employees gain the shop math and other skills they need. This collaboration should benefit both our workers and Oregon Iron's ability to compete for and fill contracts.

Finally, we believe that support for programs linking industry employers and engineers-in-training can be productive. Oregon Iron has benefited from our close relationships with Oregon State University and Portland State University through the Multiple Engineering Co-op Program (MECOP). Through MECOP, students obtain paid internships with manufacturers during their training. That helps students, including those from historically underrepresented groups, learn and understand the sector. It also helps companies find local workers to hire.

We applaud the Manufacturing Jobs for America Initiative, which you, Mr. Chairman, are helping to lead. This initiative's focus on workforce training is an important step in ensuring an adequate supply of skilled workers.

#### *2. Buy America Provisions*

Government contracts that include Buy America requirements also have the potential to invigorate American manufacturing. For one thing, they help level the playing field; Oregon Iron knows first-hand that if you want to build a boat for Brazil, you build it in Brazil. Other countries include local sourcing requirements when they procure goods, and it makes sense that when the United States Government uses public dollars to buy boats or build bridges, it should contract with United States companies to do that work.

We support efforts to ensure that companies maintain ongoing operations in this country as a condition of satisfying Buy America requirements. Such an approach

creates longer-term local jobs than would an interpretation of Buy America rules that enabled a foreign company to set up a temporary operation in the U.S. to qualify for a job and then exit once it completed the contract.

Mr. Chairman, you have led recent efforts to improve the way Federal agencies do business, and to ensure that when Federal funds are used, they are used to buy products from American companies. We are grateful for these efforts, and for the improvements made through the passage of MAP-21. We are hopeful, Mr. Chairman, that your Buy America provisions in the Senate's Water Resources Development Act are retained during conference with the House on their version of this important water infrastructure legislation.

We also appreciate work by the U.S. Department of Transportation (DOT) to manage Buy America requirements in a manner that strengthens the domestic supply chain. Former Secretary Ray LaHood and current Deputy Secretary John Porcari have been creative and proactive in helping people find and create U.S. products where many thought none were available. This effort continues under the leadership of Secretary Foxx.

The Federal Transit Administration (FTA) has also been a leader in this area, requiring that FTA-funded transit vehicles/rolling stock contain at least 60 percent domestic content. (The streetcars we produce contain an average of at least 70 percent domestic content, and 100 percent domestic assembly.) FTA has also ensured that Federal dollars are invested in U.S. business and labor. From 2008–2012, initial requests to FTA for Buy America waivers numbered 37. FTA has been able to reduce that number to just 3 for 2013 by working hard to identify local suppliers of components. Recently, the FTA and the United States Department of Commerce's National Institute of Standards and Technology entered into an interagency agreement that will help transit properties and companies more easily find U.S.-made components. This will benefit our company and many others.

We also appreciate the U.S. Dept. of Commerce's many initiatives to "make it in America" and to launch the Investing in Manufacturing Communities Partnerships.

The Buy America rule has given Oregon Iron and United Streetcar the ability to compete where no American company had competed in over 60 years. When we started out, streetcars operated in the U.S. generally came from the Czech Republic, Germany, Spain, and Japan. By creating a minimum requirement for domestic content in this industry, the United States Government created an opportunity for domestic manufacturers to enter a new market. It also created an incentive for foreign companies to start investing in facilities and products in the U.S. Buy America rules have strengthened competition in the U.S. streetcar market.

We encourage you to support and strengthen Buy America rules as part of your economic policy agenda.

### *3. Access to Capital*

A crucial ingredient to Oregon Iron's success, including to the success of our streetcar work, has been access to private and public capital.

*Private Capital:* In the midst of the Great Recession our company's leaders did not sit on their money. Instead, they invested it to create a new industry by building the production facilities and purchasing the equipment we now use to build streetcars. Significant private investment is crucial to any start-up; when times get tough, there is no substitute for personal skin in the game to keep business people working hard.

At the same time, modest levels of Government investment, including through tax credits to support capital investments, provide a crucial complement to private capital. We think some efforts to increase access to capital for business creation could be helpful if accompanied by a strong requirement for entrepreneurs to also put their own resources on the line. Through tax reform, small businesses could have improved access to working capital. Current tax law requires small businesses to pay taxes on in-process projects despite not receiving complete payments from either a prime contractor or Government entity. Without substantial bank funding, small business growth is limited by its access to operating capital.

*Public Capital:* Eight years ago Congress provided a modest level of funding to stimulate domestic streetcar production. The U.S. DOT, this Administration, and the FTA invested research dollars to investigate the potential for a U.S.-made propulsion system and off-wire technologies. The U.S. DOT (along with HUD and EPA) through the Urban Circulator and TIGER grants, has helped transit entities all over the country develop streetcar systems and other public transit systems. These investments have generated significant returns by creating a new industry, jobs, improved transportation systems, and more livable communities.

Mr. Chairman, this Committee provided the foundation for critical transit investments and changes in SAFETEA-LU and in MAP-21 that have reduced red tape

and costly steps in the approval of transit projects. I want to thank you for all this Committee has done to ensure more efficient and cost-effective Federal investments in critical infrastructure.

Local governments make all kinds of investments to stimulate economic development. Procurement decisions are some of the most powerful investments. The decision by officials in Portland, Tucson, and Washington, DC, to buy streetcars from our company, and to pay us for our work as we hit our performance benchmarks, has provided some of the most important capital we have received.

We remain thankful that the Oregon Legislature and Oregon Department of Transportation provided crucial capital to help build Portland's transit system. We also appreciate that Clackamas County has provided approvals, permits, a low-cost lease, and other support so that Oregon Iron could remain and grow in Clackamas County.

### **Conclusion**

Manufacturing provides the kinds of good middle class jobs that help families thrive. By supporting technical training for workers, retention and strengthening of Buy America rules, and tax credits and other tools to help entrepreneurs access necessary capital, the Members of this Committee can help our country's manufacturing sector thrive and grow. That would be good for the economy and good for local families.

Thank you again for this opportunity to testify. I would welcome your questions.