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Mr. Chairman, members of the Committee, thank you for the opportunity to take part in this hearing. The subjects that we are to discuss today are the ones to which I have devoted much of my life. I was for almost 20 years the head of the research effort of a major international corporation, (IBM), for the last 17 years as the head of a major foundation (Alfred P. Sloan) deeply interested in science and technology. In addition, for almost my entire adult life, I have been active as an individual researcher first in mathematics and more recently in economics, I am pleased and honored to be here today and to have this opportunity to testify.

I will make only one basic point in my testimony: *In this new era of globalization the interests of companies and countries have diverged. In contrast with the past, what is good for America's global corporations is no longer necessarily good for the American people.*

The effect on the United States of the internationalization of the scientific and technical enterprise can only be understood as one part of the revolutionary process of globalization, which is fundamentally revising the relation of companies to the countries from which they have originated. In this new era of globalization the interests of companies and countries have diverged. *What is good for America's global corporations is no longer necessarily good for the American economy.*

In 1953 when General Motors Chairman Charlie Wilson told the U.S. Senate that "For years I thought what was good for the country was good for General Motors and vice versa"; he was articulating a philosophy and belief that when American corporations were successful it was generally good for the American people. But that was before globalization.

What "Engine Charlie" Wilson thought was largely true then because American corporations invested and prospered right alongside the American worker. Whether it was in GM manufacturing plants or in IBM s research and development labs *companies gave American workers the tools to outproduce the rest of the world.*

Companies thrived by having the best plants and equipment and information processing, not through having the longest work year in the world. And the workers and the American people more generally shared in that productivity and prosperity.

Misalignment Of Company And Country

But over the last decade, what is good for the country and what is good for corporate America have gotten out of alignment. Today, most companies emphasize, to the exclusion of nearly everything else, corporate profitability and shareholder benefit. By measuring themselves only on profit in a globalized world, American companies may be able to succeed, but America the nation and American workers cannot.

We understand that profit is a creative force. Companies come into existence to create profits, and in turn they create GDP, the goods and services that constitute a nation's economic output. And in constantly striving for more profits, companies become ever more efficient and create ever more GDP. As Adam Smith pointed out, "It is not from the benevolence of the butcher, the brewer or the baker that we expect our dinner, but from their regard to their own interest."

But globalization has now made it possible for global corporations to pursue their profits by building capabilities abroad. *Instead of investing alongside U.S. workers and using their investment and R&D to increase their productivity, corporations today can produce goods and services abroad using low-cost labor and import them into the U.S.* But in creating their profits this way, they are building up the GDP of other countries while breaking their once tight links with America's own GDP.

All of this is part of the process of globalization.

Globalization of Science and Technology

The role of science and technology in globalization needs to be understood. S&T does not contribute to a nation's wealth directly by employing large numbers of people in high value-added or high wage jobs. It contributes by supporting a small number of people whose work is intended to give a competitive edge to the end product, whether that is goods or services. It is these end products, whether they are cars or computers or medical services that make up the bulk of a corporation's revenues and support the wages of its employees.

If in the process of globalization the production (or delivery in the case of services) of the end product moves overseas, so do the wages. Even if R&D remains behind, the vast bulk of value creation has moved to another country and it is there that it supports the wages of employees. This is an important shift. It is important, because in the long run a country cannot consume more value than it produces and this shift decreases the value it produces.

Of course what we see is that R&D is also moving offshore, so that form of value creation is also moving to other countries.

It is at this point that a common confusion enters. If these production, delivery of services and/or R&D shifts occur as the free and unfettered actions of corporations the theory of free trade is invoked to say that although this is painful for those who lose their

jobs, the result is cheaper and better goods that benefit consumers, so that overall the country comes out ahead.

However that is an incorrect characterization of the theory of free trade.

Trade and Productivity Changes - Globalization is not Free Trade

Free trade owes its deserved appeal to the sound notion that if all countries produce the things at which they are best, and then trade those goods and services with countries which themselves produce what they supply best, then the global community and its workers will all benefit. Economic theory uses the phrase "the gains from trade" to describe this.

In their analysis of trade economists usually take *productive capabilities as fixed* and describe trade in the goods and services that those capabilities provide. It is this narrow meaning of trade that economic theory clearly shows to be superior for both parties over failure to trade. Hence economists emphatic rejection of tariffs and other barriers to trade.

But when productivity capabilities are not fixed but are changed in the countries that are trading with each other, as they are in globalization and as they are changing today especially in Asia, the world finds itself in a whole new ball game. The end result of that change, even when the period of adjustment is over, may be better for one's country or it may be worse, depending on the circumstances[1]. And globalization is clearly replete with productivity changes.

Conclusions about trade in the narrow sense with fixed capabilities should not be confused with conclusions about the effect of productivity shifts. *There is nothing in either common sense or economic theory which says that improvement in the productivity capabilities of other countries is necessarily good for your country.* This observation holds true even if these productivity shifts are brought about by the free and unfettered actions of corporations[2]

When the U.S. trades semiconductors for Asian t-shirts, for example, that is trade in the narrow sense[3]. And the conclusion of the most basic economic theories is that this exchange clearly benefits both countries. But when U.S. companies build semiconductor plants and R&D facilities in Asia rather than in the U.S., then that is a shift in productive capability, and neither economic theory nor common sense asserts that shift is automatically good for the U.S. even in the long run.

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[1] In Reference [5] Gomory and Baumol discuss when productivity shifts are mutually beneficial and when there is in fact a conflict in national interests.

[2] In fact the economic literature has a long history of both general theories and specific examples by distinguished economists showing that improvements in the productivity of a trading partner, even if unaccompanied by a diminution of productivity at home, can be harmful to the home country. References [1], [2], [3], [4] and [5].

[3] Generations of economist have been trained on the England makes textiles, Portugal makes wine model. In these discussions no productivity shift was involved.

Since *globalization is free trade plus productivity changes* the benign conclusions of the free trade model with fixed capabilities simply do not apply to globalization.

However, even in these circumstances theory does continue to point steadily to the benefits of free trade. If there is a productivity change, the free trade outcome with the pre-change productivities is better than one with tariffs, and the free trade outcome with the new productivities is a also better than it would be with tariffs. Free trade does not guarantee that the productivity change is good for both countries, but both the before and after outcomes would be worse without it.

Harmful and Helpful Productivity Shifts

Productivity shifts have often figured in the common discussions of trade. For a long time it was an article of faith that whenever a productivity shift occurs the U.S. will automatically be certain to export unproductive low paying jobs, while our workers are moved up to more productive, more highly paid positions – and for an equally long time, this was, indeed, a reasonable description of the productivity shifts that the U.S. experienced. But that is not the picture before us today.

Since productivity changes are an essential element in globalization, and they can be harmful as well as helpful it is evidently essential to determine when they help and when they harm. Together with well-known economist William Baumol I have written a book [Ref. 6] and a number of papers on this subject using the most standard of economic models [References], and I will summarize our conclusions below. However, first we need to discuss just why the answer matters.

As we pointed out in our book [Ref 6, pp71-73] there can be a divergence of interests between multinational firms and their home country. An overseas investment decision that results in productivity increases abroad may prove to be very good for the profits of a multinational firm, but it is far from automatic that it will also be good for the firm's own country as a whole. So the answer does bear on what people are seeing and are concerned about.

Our analysis shows that the impact on the home country of productivity increases in its trading partner can be favorable if the productivity increases occur in a very low wage country. American imports from that country become cheaper, trade expands for both nations and the result is mutual gain. But this becomes less true as the developing nation acquires greater capabilities and assumes a larger share of world production. At some point further development of the newly developing partner *becomes harmful* to the more industrialized country. Then, a firm that is moving production of goods and services overseas may find that it is generating greater profits for the company, but the same action can also result in an actual loss of national income for the company's home country. The home country will still be better off than it would be if trade were cut off altogether, but its position will be inferior to what it was before the improvement in the productive capacity of its developing trading partner.

Why Does This Happen?

We obtain this result unequivocally from a careful mathematical analysis using the actual and standard equations employed by economists in their study of economic equilibrium. But the logic can also be understood in common sense terms.

In the simplest models of trade[4], wages of countries reflect the proportions of world value they produce. A country that produces more than its population share of world value[5] will be a high wage country; one that produces little will be a low wage country. Consider a low wage developing country, Devland, with which the more developed Homeland is trading a variety of products. Suppose that Devland succeeds in increasing to near Homeland levels the productivity with which it produces a commodity, clothtex that it has been importing from Homeland. Because of its low wage, it can now produce clothtex at a new low price and so it succeeds in taking over all or part of the clothtex market. As the new situation settles down we would expect the wage in Devland to have increased relative to the wage in Homeland as Devland now makes a larger proportion of the world's goods.

The overall economic effects on Homeland are then: (1) consumers in Homeland get clothtex at lower prices and (2) because of the new higher relative Devland wage, the prices of the other goods imported into Homeland from Devland go up. With clothtex having become cheaper for Homeland consumers, while the other imports have become more expensive. This can either be a good or bad outcome for Homeland, depending on how much the price of clothtex has declined and how much else is being imported from Devland. For this reason such productivity shifts may often not be benign.

We emphasize that a negative outcome for the home country is not exceptional or rare. The simplest example is provided by the standard England (cloth) – Portugal (wine) model often used to illustrate the benefits of free trade. If we add to that familiar model the effect of production shifts by allowing a cloth industry to emerge in Portugal, the effect is to lower the standard of living of England and raise that of Portugal,[i]

More generally how do these two effects balance out? The favorable effect of each individual industry shift is not likely to grow as Devland develops since Devland is most likely, to take over the industries in which low wage matters most, or industries in which they have some level of natural advantage such as climate or culture. However, the unfavorable effect will steadily become more important as the Devland develops further and Homeland imports more and more from them.

We can now see why the result we described above occurs. *At some point ever-further development of the newly developing partner becomes harmful to the more industrialized country.*

[4] Often referred to as Ricardian models.
[5] As measured by current prices

Where are we now?

Our calculations tend to show that we move from benefit to loss when the wage of a country with which we are trading rises to 1/4 or 1/3 of the U.S. wage. The size of the trading partner also matters, and we get into losing territory earlier when the trading partner has a large population. If we had to guess, we would venture that we are now at that point in relation to some of the Asian countries.

Of course, one may well argue that even that is a benign outcome for the world. Perhaps we are too rich and we *should* give up something to those who are poorer. That is a perfectly defensible position. However, that is not the way globalization and offshoring are usually described to the American people. Rather, we are assured that it is bound to make us richer in the long run, after the pain of change has been absorbed.

To summarize: The most standard basic economic theory deals with the universal benefit of free trade between countries with fixed productivities. Most discussions, however, lump that conclusion with those valid for the effects of developments that change the capabilities of the trading partners. The uniformly benign features of the fixed productivity case are then claimed for the more general one as well. There is no basis for these claims. Analysis shows that the results can go either way, so the people of this country should not count on some long-range outcome that must inevitably make up for present pain. That day may never come.

Alan Blinder recently pointed out in *Foreign Affairs* [6], that the effect of the production shifts that are likely to occur may well be so large that it is hard to think of them as even reasonably benign. Our calculations show the same thing, a developed country trading with a much larger (in population) country that is initially undeveloped and then increases its productivity capabilities, can suffer a precipitous drop in its standard of living. But our analysis shows no reason to expect that to be only a temporary pain.

Protectionism and Globalism

One might well wonder how two such mistaken concepts, protectionism, in which we forgo the gains from trade, and the automatic win-win view of globalization which we will refer to as "Globalism" which at times put our economy at risk, can persist with so little rational underpinning, but the answer is not hard to find.

Protectionism thrives, and will continue to thrive, because of the support it gives to the immediately affected domestic manufacturers and their employees. Similarly globalism is thriving today at least partly because it supports and gains support from a group that is very powerful today, the multinational corporations. For that reason we think that both protectionism and globalism will be with us for a long time to come whatever the rationality of these views from the point of view of economic theory.

[6] Reference to Blinder article.

In addition both protectionism and globalism have a natural structure that contributes to their persistence. Tariffs and other impediments to trade may provide large benefits to the limited set of firms in the protected industries and their employees, while the diffused damage to the rest of the nation, though far greater in total, may only have a small effect on each of the many individuals upon whom the burden falls. Similarly, outsourcing may substantially benefit a small group of firms at the expense of widely diffused costs falling on the rest of the nation to a degree hardly noticed by each affected individual. Thus, the proponents of socially damaging trade protection or socially damaging outsourcing are likely to be organized and strongly motivated, with little effective opposition from the remainder of the community, though the latter, in total, bear the brunt of the damage.

Can Anything Be Done?

This testimony does not pretend to take on in any systematic way the task of answering the question, "What is to be done?" I will be content if I can contribute to clarification of the some of the issues. However just the distinctions about trade we have made are suggestive.

To obtain the benefits of trade in the narrow sense we need free trade. This means, in particular, that we need to address the major distortions in the market caused by the systematic mispricing of Asian currencies. If we do not have a free market in currencies we cannot claim that the benefits of free trade are being achieved.

At the same time, turning back to the issue of changing productivities, we must continue to improve U.S. productivities relative to those of the Asian nations. This often translates into asking for improved K-12 education and more money for R&D. Improved education is hard to come by and it is hard to imagine an improvement in education so profound that it turns out Americans who are so productive that they are worth hiring in place of the four or five Asians who can be hired for the same wage. More R&D can only help but it should be clear from the discussion above that R&D, even if it remains in the U.S., can have only a limited impact. *Proposals of this sort about education and R&D can only be helpful. They can only be harmful if they create the mistaken belief that these measures can deal with the problem.*

I think that effective measures will have to tackle the problem more directly. Asian countries have made it profitable for foreign (often U.S.) corporations to create high value added jobs in their countries by offering tax and other incentives that make it *profitable* for corporations to locate high value added jobs in their countries. We need to look hard at incentives that reward companies in the U.S. for the same thing. If we want high value added jobs let us reward the companies for producing such jobs whether they do that through R & D, or just plain American ingenuity or by any means.

One such possibility is a corporate tax rate that would be scaled by the value added per FTE by the workers of corporations operating in the U.S. A company with high value add per U.S. employee would get a low rate, a company with low value add per U.S. employee would get a high rate. This tax could be made revenue neutral. It would be

an incentive for companies with high value added jobs to locate and keep their operations in the U.S. It could be as strong or as weak an incentive as desired.

Many incentives, some natural and some much less so, have worked in the U.S.'s favor and have helped to create a long history of economic growth. We have had a great range of natural resources, and a remarkable culture of entrepreneurship that helps ideas to become reality, and which provides rich rewards for that accomplishment. We have had corporations in which it was recognized that it was in their own interest to invest alongside their U.S. workforce and make it possible for them to increase their productivity. *We need to consider incentives, such as the tax mentioned above, that realign the profit interest of corporations with the interest of the country.* In short, we think it likely that there is a major problem facing this country and we also think there are actions, most as yet largely unexplored, that can make a significant and beneficial difference.

References

[1] Hicks, J.R. 1953. ***An Inaugural Lecture***. Oxford Economic Papers 5: 117-35

[2] Dornbush, Rudiger W., Stanley Fisher, and Paul A. Samuelson 1977 Comparative ***advantage, trade and payments in a Ricardo model with a continuum of goods*** American Economic Review 67 pp 823-829

[3] Krugman, Paul R. 1985. ***A "Technology Gap" Model of International Trade*** in K. Jungenfelt and D. Hague eds. "Structural Adjustment in Developed Open Economies", New York, St. Martin's Press pp 39-45

[4] George E. Johnson, Frank P. Stafford "***International Competition and Real Wages"*** *The American Economic Review*, Vol. 83, No. 2, Papers and Proceedings of the Hundred and Fifth Annual Meeting of the American Economic Association (May, 1993), pp. 127-130

[5] Samuelson, Paul A, 2004, Where ***Ricardo and Mill Rebut and Confirm Arguments of Mainstream Economists Supporting Globalization Journal*** of Economic Perspectives – Volume 18, Number 3 – pp 135-146

[6] Ralph E. Gomory and William J. Baumol, 2001, ***Global Trade and Conflicting National Interests***, MIT Press

Endnote

[1] Even the familiar England-Portugal textile-wine model shows this effect. We assume, as usual, that England is much more productive in textiles and Portugal is much more productive in wine. With free trade and no productivity shifts England makes all the textiles and Portugal makes all the wine. If consumers spend a larger proportion of their incomes on textiles than on wine, England's wage will be higher than Portugal's, but both countries are better off than if they did not trade.

Now let us consider globalization that adds productivity shifts to the free trade model. Through globalization Portugal learns textile manufacturing and enhances its productivity in textiles to something close to England's. Because of its lower wage, Portugal can now enter the textile market. However textiles are still England's only products. To remain in the textile market and meet the new lower price for textiles, wages must go down in England relative to Portugal, so there is a new exchange rate.

At the new equilibrium, because of the exchange rate shift, the price of wine has gone up in England and consumers in England can afford less wine. English consumers with their new lower wage may consume about the same amount as before of the now cheaper textiles. However, with less imported wine, their standard of living will have fallen under globalization.

Portugal still exports wine to England and imports textiles. But it imports a smaller quantity of textiles, since it now has the homegrown product as well. Portuguese consumers can now afford to consume more textiles because they are cheaper. They consume the same amount of wine as before. Their standard of living will have improved.