Chinese Economic Growth: How Will It Affect the U.S. Gains from Trade?

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Summary

That there are mutual gains from trade is the central premise of the economic case for free and open trade between countries. Typically, the gains from trade are rooted in differences in resource endowments (i.e., the relative abundances of land, labor, capital, and technology), leading to each trading economy having a relative efficiency advantage in the production and export of a particular good or class of goods. Economists call this trade based on *comparative advantage*. Comparative advantage can be expected to be a particularly important basis for trade between an advanced industrial economy, such as that of the United States, and an emerging economy, such as that of China, where the two countries' resource endowments are very different. The size and source of the U.S. gains from trade with a rapidly growing emerging economy like China's are not necessarily going to be a static phenomenon, however. With economic growth, the economic circumstances of both trading partners change, altering the relative abundances of economic resources, the source of each country's comparative advantage, and possibly each country's *share* of the gains from trade. A nation's *terms of trade*, defined as the ratio of the average export price to its average import price, is a measure of the export cost of acquiring desired imports. Increases and decreases in terms of trade indicate whether a nation's *gains from trade* are rising or falling.

With expanding trade with growing emerging economies that have changing resource endowments, the U.S. economy's terms of trade may move as this growth causes changes in the worldwide demand for and supply of the goods and services that the United States exports and imports. Given its current and prospective size, China's impact on these forces could be large. China's main impact on the U.S. terms of trade over the last decade has been through the falling price of U.S. imports from China, transmitting a favorable impulse to the U.S. terms of trade. It also seems likely that the impact of the economic growth of China on the U.S. terms of trade over the near term will continue to be dominated by the favorable effects of a falling price for imports from China. Over the longer term, conclusions are more tentative. Several factors point to a favorable outcome for the United States; however, some deterioration of the U.S. terms of trade may be the unavoidable consequence of successful economic development in large emerging economies such as China (as well as India, Russia, and Brazil). The economic benefit to the world economy from large numbers of people accomplishing the very difficult transformation from poverty to a steadily rising standard of living is great.

Economic policy can *indirectly* have a positive influence on the economy's terms of trade. Relevant policies would likely include macroeconomic policies that minimize economic instability and increase the incentive for economic agents to undertake the forward-looking activities of investment and innovation; policies that give focused public support to knowledge-producing activities, such as education and scientific research (that are very likely undervalued and under-produced by the private market); and continued bilateral and multilateral initiatives to lower trade barriers at home and abroad. This report will be updated as events warrant.

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Economic Growth and the Gains from Trade

That there are mutual gains from trade is the central premise that informs the economic case for free and open trade between countries. Typically, the gains from trade are rooted in differences in resource endowments (i.e., the relative abundances of land, labor, capital, and technology), leading to each trading economy having a relative efficiency advantage in the production and export of a particular good or class of goods. Economists call this trade based on *comparative advantage*.

The critical, but seemingly counter-intuitive, insight of this economic theory is that what matters for establishing a basis for trade is not absolute cost but relative cost. A country could have an absolute cost disadvantage in all goods, yet still be able to realize gains from trade. (It follows that a country with an absolute cost advantage could also gain from trade.) All that is needed for comparative advantage to exist is a difference in relative cost, that is, a difference among countries in the rate at which the output of one good must be curtailed to expand production of another good. (In other words, a difference in *opportunity costs* exists). If these rates are different, then each country has a *comparative advantage* in the production of a good (or class of goods), creating the potential for gains from trade. In this circumstance, each country can improve its economic well-being by *producing what it does best and trading for the rest.*

Comparative advantage is a particularly important basis for trade between an advanced industrial economy, such as that of the United States, and an emerging economy, such as that of China, where very different resource endowments cause significant differences in each economy's relative efficiency at producing different goods. Economic theory predicts that comparative advantage is likely to occur in the production of goods that use each economy's relatively abundant resource intensively. China has a relative abundance of low-skilled labor, a relative scarcity of human and physical capital, and a low level of technical knowledge. In contrast, the United States has a relative abundance of human and physical capital, a high level of technical knowledge, and a relative scarcity of low-skilled labor. In this circumstance, the comparative advantage for China will be manifest in the export of goods that are produced using low-skilled labor intensively, such as apparel, footwear, toys, and final assembly of electronic machinery and equipment. In contrast, the comparative advantage of the United States will be in the export of goods that are produced using human and physical capital and technology intensively, such as aircraft, software, pharmaceuticals, and high-tech components of electrical machinery and equipment.

Unfortunately for each country, trade based on comparative advantage will have negative effects on domestic industries and among groups of workers displaced by imports. In the long run, however, the overall effect of trade on each trade partner is an elevation of economic well-being over what would be possible without trade. This win-win outcome has been confirmed by a preponderance of evidence.

The size and source of the U.S. gains from trade with a rapidly growing emerging economy such as China's are not necessarily going to be a static phenomenon, however. As the relative economic circumstances of trading partners change with economic growth, altering the relative abundances of economic resources and the source of each country's comparative advantage, the size of each country's gains from trade could also change. Trade can still leave a country better off than would be true without trade, but the size of the country's gains from trade could rise or fall depending on the character of the changes in its economic circumstances and those of its trade

partner. The great potential size of the Chinese economy and its high volume of international trade could mean that the impact of such changes in relative economic circumstances on the U.S. economy emerging with the economic growth of China could be substantial.

The Economic Significance of the Terms of Trade

In a framework that focuses on the economic impact of trade over time, it can be telling of an economy's international trade performance from increased trade to also consider whether there has been any *long-term* trend in the nation's share of the gains from trade. Because the benefit of free trade resides in the product received (the import), while the cost resides in the product given (the export), the gains from trade to the nation rise if, for any given *volume* of imports, it exchanges a *smaller volume* of exports rather than a *larger volume*. A nation's *terms of trade* is a measure of the average export cost of acquiring desired imports. Increases and decreases in its terms of trade, defined as the ratio of the economy's average export price to its average import price, indicate whether a nation's *share* of the *gains from trade* is rising or falling. Although trade is a process of mutually beneficial exchange, each trading partner's *share* of those benefits can change over time, and movement of the terms of trade is an indicator of the direction of that change, up or down, in the share of the gains from trade.

More specifically, this is a question of whether, over time, the U.S. economy's *terms of trade* has tended to rise or fall as the industrial output and export sales of China and other low-wage economies has grown. A rising trend would indicate that a country's trade performance has improved relative to other trading countries, reaping an increasing share of the gains from trade, and real income benefits for the economy. Similarly, a decrease in the ratio of export prices to import prices—a deteriorating terms of trade—raises the export cost of acquiring imports and reduces the gains from trade. A falling trend would be indicative of deteriorating trade performance, decreasing share of the gains from trade, and decrements to real income. A deteriorating terms of trade does not necessarily mean that trade, overall, is not beneficial and that the United States would be better off without trade. It has merely become less beneficial. In circumstances where the volume of trade is rising, there may not be an absolute decline in real income; rather, the rate of income growth will be slower than it otherwise would be.

The terms of trade will not fully reflect the gains from trade that come from other bases for trade, most importantly, the *realization of economies of scale*. Gains due to scale economies are of greater significance for trade between mature economies that have similar factor proportions (i.e., the United States, Europe, Japan, and Canada).[1] Scale economies are a basis for trade that have steadily risen in importance in trade among the United States and other advanced economies. This could lead to a partial offset to any loss in the gains from trade associated with any loss in comparative advantage. Nevertheless, movement in the terms of trade would still be indicative of changes in the gains from trade coming from rising trade with low-wage economies that would still have very different resource endowments (i.e., relatively large supplies of low-skill labor and

[1] If some degree of product differentiation can be achieved, there will be opportunities for specialization and trade. Also, this type of trade does not cause the sharp impacts on each country's distribution of income that typically occurs with trade based on comparative advantage. Even if all countries are equally adept at producing any given good, no single country is likely to have the productive capacity to produce the full spectrum of products demanded at the least-cost scale of operation. If some degree of product differentiation can be achieved, there will be opportunities for specialization and trade. Also, this type of trade does not cause the sharp impacts on each country's distribution of income that typically occur with trade based on comparative advantage.

relatively small supplies of capital and high-skill labor). It is possible, over the long run, that the U.S. gains from trade based on comparative advantage coming from trade with China and other emerging economies could also diminish as the latter become more like advanced economies in their resource endowments, making them capable of efficiently producing many of the goods and services that the United States now exports to them and other economies. At the same time, gains from trade with China derived form scale economies may grow in importance as a basis for generating U.S. gains from trade.

What Will Change the U.S. Economy's Terms of Trade?

In a growing world economy with expanding international trade (particularly with a growing share of that trade with emerging economies with very different resource endowments), the U.S. economy's terms of trade (the ratio of the average price of U.S. exports to the average price of U.S. imports) will move in response to trends in the worldwide demand for and supply of the goods that the United States exports and imports. In general, and other factors constant, an increase in the worldwide demand for U.S. exports tends to pull up the average price of those exports and thereby improve the U.S. terms of trade. Similarly, an increase in the worldwide supply of the goods that the United States imports will tend to pull down their average price and improve the U.S. terms of trade. In contrast, an increase in the worldwide demand for the goods that the United States imports tends to pull up their average price and worsens the U.S. terms of trade. A worsening of the terms of trade could also be caused by an increase in the worldwide supply of the goods the United States exports because it will tend to increase their average price.[2]

Emerging economies in the stages of economic development, such as China's, often show an inclination to produce goods to be exported to countries with advanced economies, such as the United States. This pattern will not only be a reflection of the emerging economies' comparative advantage, but also a reflection of the size and strength of the U.S. economy that makes exporting to it a very reliable engine for propelling sustained economic growth in emerging economies, which often have small and unstable domestic markets. If this export-led growth leads to a sizable increase in the worldwide supply of these goods, then their price tends to fall and the U.S. terms of trade tends to improve. Export-led growth has been a successful development strategy in other Asian countries such as Japan in the early post-war era and, more recently, in South Korea, Singapore, and Taiwan.

However, as the process of economic development evolves in emerging economies, they tend to absorb technology, accumulate human and physical capital, and, as a result, become competitive with advanced economies in their productive prowess, in some areas of economic activity. This can change the source of comparative advantage and make it possible for an emerging economy to produce some goods that could compete with the exports of the advanced economy. This competition can occur not only within the emerging economy, as it substitutes domestic

[2] The impact of relatively short-term changes in the dollar's exchange rate, unrelated to long-term changes in international demand and supply, on the U.S. terms of trade are being ignored in this analysis. International flows of financial capital (the buying or selling of U.S. assets) will influence the path of the dollar exchange rate. These capital flows may be in response to changes in macroeconomic policy or other reasons for shifts in investor preferences between U.S. and foreign assets. These impacts tend to have a cyclical pattern and do not generally result in an enduring trend, up or down.

production for the exports of advanced economies, but also in head-to-head competition in other economies. Japan is an example of a nation that has evolved into an advanced economy that competes worldwide with U.S. exports

However, it is not only economic growth in emerging economies that can affect the U.S. terms of trade—so can economic changes induced within the advanced economies themselves. Advanced economies, particularly the United States, are most often the wellspring of technological advance and economic innovation, steadily generating both a stream of new products and more efficient production techniques. Yet, these fruits of technological advance will have an opposite effect on the innovating economy's terms of trade. On the one hand, although production by foreign producers can erode the gains from trade attached to any particular export, the ongoing process of innovation can create a new source of comparative advantage and a new product to export. For a highly innovative economy, its comparative advantage may, in fact, lie in the ongoing production of new ideas and products, which causes the steady generation of new sources of the gains from trade that will also generate an enduring positive impulse to the economy's terms of trade.

On the other hand, if technological change in the United States emerges as an improvement in the efficiency of the productive process for existing products including exported goods, it increases the worldwide supply of those goods, tends to reduce their price, and in turn, to decrease the U.S. economy's terms of trade. For this case, in addition to this supply-side-induced decrease of export prices pulling down the terms of trade, there can be an associated positive demand-side impulse to import prices that adds further to the downward push on the terms of trade. This arises because this type of technological change also increases the advanced economy's total output and total income. Higher income causes an increase in the advanced economy's demand for imports, which tends to pull up import prices and, as a result, contribute to the decrease of the advanced economy's terms of trade. (While any induced reduction in the terms of trade has a negative effect on real income, in most circumstances, the overall effect of advances in productivity on real income is positive.)

It is difficult to predict the ultimate long-term effect of these several positive and negative impulses caused by economic growth at home and abroad on the U.S. economy's terms of trade. Over time, it is possible that economic growth in the rest of the world could show a bias toward either production of goods the United States exports or a production of the goods it imports. If export-biased, the economic growth abroad will cause a more than proportionate increase in the worldwide supply of goods that compete with U.S. exports, tending to reduce the price of U.S. exports, inducing a deterioration of the U.S. terms of trade. That deterioration is a decrement to the United States' economic welfare, and an increase to that of its trading partners. In contrast, if economic growth in the rest of the world is import-biased, there will be a more than proportionate increase in the worldwide supply of the goods the U.S. imports, pushing down import prices and inducing an improvement in the U.S. terms of trade over time. That improvement translates into a gain in U.S. economic welfare to the detriment of our trading partners.

The Path of the U.S. Terms of Trade, 1960-2006

Relative to its peak in the mid-1960s, the U.S. economy's terms of trade has certainly declined, but the period of trend-like decline stops around 1980. The deterioration in this earlier period was at about 1.0% per year. The impact, however, of this fall of the terms of trade on U.S. economic welfare would be proportional to the share of imports in GDP, which in this period was about 10.0%. This would then translate into an annual real income loss of about 0.1%. This annual rate

of deterioration is moderate, but certainly more significant if judged by its cumulative impact over nearly two decades.

This deterioration most likely reflects the recovery and return to competitive posture of industrial economies devastated by World War II. These were largely economies with resource endowments similar to those of the United States and who with economic recovery could be expected to increasingly compete against U.S. exports in global markets. In this period, it appears that growth in the rest of the world was, from the United States' perspective *export-biased* and accordingly pushed down the average price of U.S. exports and reduced the U.S. terms of trade.

Since the early1980s, the U.S. terms of trade has fluctuated moderately, but it *has not* shown a sustained trend, up or down. It rose in the early 1980s, fell in the late 1980s and early 1990s, and then moved up again through the late 1990s to the present. It is likely that this undulating but trend-less path was mostly a reflection of the effect of relatively short-term movements of the dollar's exchange rate on export and import prices, suggesting that there was no enduring net force, up or down, being generated by the strong and enduring demand and supply conditions in the global economy. It is, of course, in this recent trend-less 25-year period that trade with emerging economies has grown. So whatever impact the growth of emerging economies may have had on the U.S. terms of trade, it was not strong enough by itself to induce an upward or downward trend in that measure. It would seem then that growth in the rest of the world in this period was, on balance, without a bias towards either the goods the United States exports or imports, and there was no evident change in the U.S. share of the global mutual gains from trade.

China's Effect on the U.S. Terms of Trade

A rising level of U.S. trade is a clear consequence of economic growth in the rest of the world in the post-WWII era. In recent years, this has included the expanded participation of low-wage, developing economies, such as that of China, in the internationally fragmented production processes (in which a good has value-added generated in several locations during production) that now propels a large and growing share of international trade. Has this increased trade with China adversely affected the U.S. economy's terms of trade?

Impact So Far

First, it has certainly been the case that recent economic growth in China has been rich in the production and export of many labor-intensive goods to the United States. During the decade ending in 2006, U.S. imports from China increased nearly $236 billion, or nearly 460%, and increased as a share of total U.S. imports from 5% to nearly 12%, making China the second largest source of imports. This growth seems likely to have been largely spurred by the price advantage of these Chinese goods relative to both domestic and other foreign sources. Therefore, if anything, this inflow of Chinese goods has exerted a downward push on the price of U.S. imports and an upward pull on the terms of trade. There is limited data on the average price of U.S. imports of Chinese goods.

The U.S. Bureau of Labor Statistics (BLS) maintains fairly extensive import price indexes by locality of origin. Over the last decade, the price index for imports from newly industrialized Asian economies as a group fell about 25%. However, data on Chinese imports alone have only been available since December of 2003. During this 2½-year period, that import price index has

fallen about 2.5%. For comparison, for this same recent period, the overall import price index for Asian newly industrializing economies fell less than 1.0%. Some have suggested that because of problems in measuring price changes in recently outsourced goods, the BLS import price index for China could be significantly underestimating the true degree price reduction. What data exist seem to confirm the strong expectation that the prices of imports from China have been falling and are exerting a positive impulse on the U.S. terms of trade.

Second, economic growth in China, in contrast to the prior experience with Japan and other East Asian economies at a similar stage of development, has occurred with relatively open trade, leading to strong Chinese demand for exports, particularly of high-tech capital goods, from the United States. Over the last decade, U.S. exports to China increased about $30 billion, or nearly 350%, and their share of total U.S. exports tripled, rising from 1.5% to 4.6%, making China the fourth largest export market for the United States. BLS does not have a China-specific export price index, but this rising export demand from China seems most likely to have exerted an upward pull on the price of U.S. exports and generated a positive impulse to the overall U.S. terms of trade.

Third, it seems unlikely that there has been strong and large-scale head-to-head competition between U.S. and Chinese exports in global markets. The greater part of U.S. merchandise exports is in relatively capital-intense, high-tech goods such as computer accessories, semiconductors, and telecommunications equipment; in sophisticated industrial machinery, such as electrical apparatus, industrial engines, and measuring testing and control instruments; in transportation equipment, such as aircraft, aircraft parts, and aircraft engines; and in medically related goods, such as medical equipment and pharmaceuticals. In contrast, a large portion of Chinese exports are in relatively low-tech consumer goods, such as furniture, toys, footwear, and apparel. China also exports a rising volume of electrical machinery and equipment that might be seen to be in more direct competition with some U.S. exports. However, these exports primarily reflect China steadily becoming the location for final assembly of many consumer electronics, computers, and information technology goods. The technical design and sophisticated components used in this assembly process are likely to be an export from the high-wage economies. Therefore, despite the high-tech nature of the components and the final good, this final assembly process is a relatively low-tech undertaking that lends itself to the intensive use of low-skilled labor and is not in competition with U.S. exports.

Fourth, a major difference in the composition of U.S. and Chinese exports is the importance of services. In 2005, the United States exported nearly $380 billion in services, representing nearly 30% of all U.S. exports. The largest type of services export was in the category called *other private services*, which includes business services, financial services, insurance services, telecommunication services, and engineering services. In comparison, China's services exports in 2004 were only about $60 billion and were heavily composed of travel and tourism services. Services exports are growing rapidly in China, up 34% in 2004, and growth over the last decade averaged a 14% annual rate. However, China's demand for services imports is equally strong, totaling nearly $72 billion and growing 31% in 2004, with a decade annual average rate of growth of 13%. This pattern of trade in services suggests that whatever impact China's increased services exports are having on the price of service exports of the United States and other advanced industrial nations may well be offset by the opposite impact from China's growing demand for services.

At this point, there do not seem to be strong reasons to believe that China's recent economic growth has had an eroding effect on the U.S. terms of trade or the U.S. share of the mutual gains from trade.

Future Impact

Of course, the future economic growth of China could have a more adverse outcome on the U.S. gains from trade. The path of economic development for China (and other low-wage economies) is likely to lead to a change in their resource endowments and to their becoming more like the capital- and skill-abundant endowments of advanced economies. As a result, this raises the probability that a rising proportion of their expanding output will be of goods and services in direct competition with the exports of the advanced economies.

Also, continued rapid economic growth by China could exert an indirect negative effect on the U.S. terms of trade through its upward push on the world price of petroleum and industrial commodities, particularly metals, of which the United States is a net importer. China is the world's second largest energy consumer behind the United States and the demand continues to grow. Because 60% to 70% of China's energy needs are likely to be met by using coal, the impact of its growth on petroleum prices is likely to be more moderate than its large scale of output would suggest. Nevertheless, its demand for petroleum will rise with its expanding size and add to worldwide upward pressure on the world price of oil. China is a net exporter of aluminum, but it is expected to have continued strong demand for steel and copper and further price increases for these metals are probable. The upward push on metal prices could be moderated by a stronger supply response in the future.

However, there are also several reasons that suggest there may not be a significant deterioration of the U.S. terms of trade associated with future economic growth in China. First, as already observed, the Chinese economy is far more open to imports than were Japan and other east Asian economies at a comparable stage of their development, and the openness of the domestic Chinese market seems likely to increase. This would likely increase the probability that already strong Chinese demand for U.S. exports will grow stronger as their economic growth proceeds. Of particular importance in this regard is the ongoing Chinese liberalization of trade in services—an area where the U.S. economy has significant comparative advantage and a good prospect of generating substantial gains from trade. Also, the Chinese economy still has huge needs for basic economic infrastructure, and this will probably maintain a strong demand for a wide spectrum of capital goods that must be imported from the advanced economies, including the United States. Global Insight projects that China's merchandise imports will increase by 475% (nearly fivefold) over the next 10 years (from $660 billion in 2005 to $3,133 billion in 2015). Assuming U.S. exports to China grow at the same rate as the projected increase in China's total imports, U.S. merchandise exports to China could increase from $41.8 billion in 2005 to $198.4 billion in 2015.

Second, given that many production processes will continue to be geographically fragmented, and that a large share of the final value of this type of Chinese exports will be derived from imported components, a large share of the gains from trade associated with the sale of this type of Chinese export will accrue to the workers and inventors, outside of China, who produced these components, including many in the United States. The importance of value-added versus source of final export is illustrated by the Apple IPod, which is assembled in China from components produced in other countries and exported to the United States for final sale. Although the IPod is an export of the Chinese economy, it is estimated that $163 of the IPod's $299 retail value is captured by American companies and workers involved in its design, distribution, and

manufacture of some components, and only about $4 of its final value is contributed by China. Because much of the final goods exported from China are like this, it seems reasonable to expect a sizable portion of any future growth of such gains to accrue to the U.S. economy.

Third, also unlike other trading partners in Asia, 55% of Chinese exports are produced by U.S.-owned and other foreign-owned firms. Therefore, even if China comes to account for the bulk of value-added on the products produced and exported by such enterprises, a relatively larger share of the gains from trade would accrue to U.S. and foreign investors through repatriated earnings to the domestic parent than was true of the growth of Japan and other East Asian countries.

Fourth, for China to compete on a large scale in the future against U.S. exports on world markets, it would have to have command of the same scope and level of industrial technology as the United States. This would likely require that China not only effectively absorb existing technology but also be able to regularly generate new technology as the United States does. Some argue that the current structure of the Chinese economy raises doubts about this occurring.

Again, unlike what occurred in Japan and other East Asian economies, technological transfer and diffusion in China has, so far, been more limited. A recent analysis by George Gilboy points to possible reasons why the Chinese economy is unlikely any time soon to challenge the technological leadership of the United States, Europe, and Japan.[3] First, as noted earlier, foreign-funded enterprises produce nearly 60% of China's exports, and the share of high-tech exports may be near 90%. Moreover, beginning in the 1990s, the Chinese government allowed foreign enterprises to move away from joint ventures and establish wholly owned foreign enterprises, and these now account for 65% of recent foreign investment in China. Such enterprises are much less inclined to share their technical knowledge, for doing so would give up their competitive advantage over both indigenous Chinese companies and other foreign enterprises, in their ability to expand market share in China. Second, China's unreformed political system suppresses the development of "horizontal networks" that establish fruitful linkages between firms and research institutions, investors, suppliers, and customers, as well as other Chinese firms. The importance of such horizontal networks is that they are thought to be the principal means by which new technology and productive knowledge is nurtured and spread through the economy. Third, most Chinese firms have not invested strongly in the creation of new technologies; China's R&D spending as a share of GDP falls well below the average share devoted to R&D by the advanced industrial economies.

Economic Policy and the Terms of Trade

The terms of trade is unlikely to be a prime focus of U.S. economic policy. Induced changes in the terms of trade are most often the collateral effect of policies aimed at other economic goals. Moreover, a terms-trade policy narrowly focused on trade between the United States and China is particularly unlikely to be effective. Nevertheless, it is useful to understand how various economic policies would influence the terms of trade, so as to craft policies that have the greatest positive effect on economic well-being. Will the behavior of the terms of trade be working with or against the desired policy outcome? Also, it is possible to configure policies that, while primarily focused on other goals, maximize the probability of a favorable terms of trade effect from trade in general and from trade with a particular country, such as China. This section considers how

[3] George Gilboy, "The Myth Behind China's Miracle," *Foreign Affairs* (July/August 2004), pp. 88-97.

various types of economic policies could influence the U.S. economy's terms of trade, and the likely practical viability of each policy.

Macroeconomic Policy

The traditional tools of monetary and fiscal policy are unlikely to be directly aimed at achieving a particular goal for the terms of trade. The target of these powerful policy instruments is economic stabilization: securing sustained economic growth, low inflation, and low unemployment.[4]

Macroeconomic policy could have an indirect but significant and enduring effect on the terms of trade. It seems probable that a consistently well-run economy in which macroeconomic policy has steadily secured rapid growth, low and stable inflation, and low unemployment is more likely to be an economy that provides a strong incentive for technological advance and innovation, has an abundance of healthy and forward-looking industries, and is a prolific creator of a broad array of goods for which there is persistent strong demand by the rest of the world. Such a demand response could have a positive effect on the terms of trade. Of course, to the extent that sound macroeconomic policy only enhances the ability to supply goods to the world market, there may be a negative effect on the terms of trade. (This is certainly not an argument against sound macroeconomic policy, merely that more is gained somewhat under the first scenario.)

Technology Policy

In economics, *technology* is the way scarce resources are combined to produce a desired good or service. Whether the growing of wheat, the manufacture of automobiles, or the development of a new drug, the steady improvement of technology over time is what drives sustained improvement in a nation's economic well-being, forestalling the slowing of economic growth that would otherwise happen due to the onset of diminishing returns, and allowing the production of more and better output from any given endowment of economic resources. One manifestation of such improvement will be a steady improvement of productivity. Another manifestation, however, could be an improvement in the nation's terms of trade, as strong international demand for new and improved products increases their export price, sending a positive impulse to the U.S. terms of trade.

What is the public policy issue here? Improving technology is largely a process of generating new ideas. However, the production of new ideas is likely an activity toward which the private market system will allocate less than the socially desirable level of resources. To the extent that new ideas lead to profitable outcomes and those profits can be secured by a private firm, the market economy will generate new ideas and foster technological change. An inherent attribute of ideas,

[4] Such macroeconomic policies can, however, have a significant indirect effect on the terms of trade. The pursuit of stabilization goals will often cause the dollar's exchange rate to increase or decrease, and exchange rate movements will directly affect the relative price of exports and imports and change the terms of trade. In the 1980s, for example, the combination of a tight monetary policy (aimed at reducing inflation) with an expansive fiscal policy (caused by tax cuts aimed at reducing the federal tax burden and by spending increases aimed at strengthening national defense) increased the level of domestic interest rates, inducing a large net inflow of foreign capital (seeking the higher relative return on U.S. assets) that, in turn, generated a sizable appreciation of the dollar. The United States' terms of trade rose with the dollar. The improvement in the terms of trade was substantial but not long lived. With a change in the configuration of macroeconomic policy and an ebbing of foreign capital inflows, the improvement in the terms of trade was reversed before the end of the decade.

however, is that they are *non-rival*, because one person using the idea does not preclude someone else from also using it. Further, ideas will often have the attribute of *limited excludability*, meaning the owner of the idea will find it difficult or impossible to charge a fee for its use. These attributes will likely cause a divergence of private benefit and social benefit, meaning that what the creator of the idea can expect to gain will be less than what the overall economy can expect to gain. In this situation, less than the socially desirable level of idea generation will occur. Therefore, this is an activity which may warrant some level of government involvement and support if it is to be done on a socially optimal scale.

Such government support could include public funding of research and development (R&D), particularly in the area of basic scientific research, where the prospect of market failure is the greatest; public funding for investment in human capital, particularly education in the sciences and engineering where benefits of cumulative knowledge often extend beyond the individual; and public support for mechanisms to establish and enforce property rights, such as patent and copyright administration. Of course, these are activities that the U.S. government does now.[5] Therefore, the critical question is whether such support is accurately targeted and undertaken on an adequate scale. This is not an easy question to give a precise answer to because the lack of a market price for the full benefits of the activity makes it difficult to judge relative scarcity.

As regards spending on R&D, there is a considerable amount of economic evidence that the social rate of return to R&D for a variety of research projects often greatly exceeds the private rate of return, suggesting that too little research is being undertaken.[6] It is also true that total R&D spending in the United States by industry and government has hovered around 2.5% of GDP for nearly 30 years. The overall steadiness of this share, however, masks divergent paths for industry and government R&D spending. While the dollar spending levels by industry and government have both increased, since the 1980s as a percentage of GDP, industry's share has risen and that of government has fallen. It is government spending on R&D that largely provides support to basic research, and this is an area where the incidence of market failure in idea production is probably the greatest. Also, because there is a great amount of serendipity in the emergence of technological breakthroughs from basic research, it is probably prudent to cast a rather wide research net than to pursue a narrower set of relatively focused endeavors.

Trade Policy

Trade policy comprises actions by government that attempt to directly influence trade performance. The most basic manifestations of such policies are tariffs to protect domestic industries from competition from imports and subsidies to promote exporting industries. These actions may affect the terms of trade.

Economic theory indicates that there can be a circumstance when imposing a tariff can improve the nation's terms of trade. By reducing the demand for imported goods, a tariff has a tendency to decrease the price of imports. However, if a tariff causes a sufficiently large reduction of the price

[5] For a discussion of current federal programs, see CRS Report RL33511, *Federal Research and Development: Budgeting and Priority-Setting Issues, 109th Congress*, by Genevieve J. Knezo.

[6] See Zvi Griliches, *"The Search for R&D Spillovers"* (Scandinavian Journal of Economics, 1991), pp. 29-47; Bruce Smith and Claude Barfield, *Technology, R&D , and the Economy* (Washington: Brookings Institution, 1996); and Charles I. Jones and John C. Williams, "Measuring the Social Return to R&D" (*The Quarterly Journal of Economics*, 63, no.4, November 1998), pp. 1119-1136.

of imported foreign goods, the economic gain from the terms of trade improvement could outweigh the distortion costs of the tariff and improve the imposing country's economic well-being.[7] The export sector can also, in theory, be an avenue by which trade policy induces a positive terms of trade effect. In contrast, an export subsidy, because it tends to lower export prices, will cause the terms of trade to decrease. Therefore, generating a positive effect on the terms of trade through export-oriented trade policy would require a negative subsidy—or an *export tax*—that raises the price of exports. If this positive effect on the terms of trade is large enough, it may outweigh the negative effects that arise from the distortion costs of the export tax.

In practice, however, trade policies that attempt to increase an economy's terms of trade by levying tariffs on imports or taxes on exports are of doubtful practical value. First, these are policies that could have potential relevance only for very large trading economies, such as the United States, whose exports and imports represent a large proportion of worldwide sales and are, therefore, able to influence the exports or imports price in the world market. Second, there is no reason to believe that such price effects are particularly large. Third, if the potential gain is large or small, there is every reason to believe that using these policy devices to generate terms of trade gains is not very likely to be sustainable due to retaliation by other nations. If these trade policy devices are used by the United States (or any nation), it would be a use of monopoly power to extract extra gains from other trading nations. This would unlikely be a matter of indifference to affected nations, but would quickly prompt retaliatory actions that would tend to not only erase any initial economic gains to the United States but reduce the economic well-being of *all* trading nations if a cycle of retaliation and counter-retaliation induced a large contraction of world trade.

Although erecting trade barriers may not be a viable means to improve the terms of trade, reducing trade barriers could be. For the United States, such a lowering of trade barriers could improve the U.S. terms of trade for two reasons. First, because the level of U.S. trade barriers is already very low relative to the level of those in China, a reduction of those barriers would likely have a stronger positive effect on the demand for U.S. exports than it will on U.S. demand for imports, tending to increase export prices relative to import prices and improve the U.S. terms of trade. Second, services trade is likely to be high on the agenda of any new round of trade negotiations. The prospect of lower barriers to services trade may bode well for the U.S. terms of trade. Services account for a much smaller share of U.S. trade than they do of GDP. The United States is the world's largest producer of services, and it seems very likely that it could export an array of strongly demanded products to the rest of the world. This can also lead to an improvement in the terms of trade as that demand pulls up U.S. export prices.

In the post-war era, the lowering of trade barriers has been primarily achieved through periodic multilateral agreements among the world's trading nations, the most recent being the Uruguay Round, which went into effect in 1994. Many would argue that it is time for a new round of multilateral reductions of trade barriers, but problems encountered in preliminary negotiations do not bode well for a new agreement in the near future. In recent years, however, the United States has pursued and implemented the lowering of trade barriers through regional agreements such as the North American Free Trade Agreement (NAFTA) and the Central American Free Trade Agreement (CAFTA) and through bilateral free trade agreements such as those concluded in recent years with Australia, Chile, and Singapore. It is possible that a bilateral agreement leading

[7] In the standard analysis, this positive effect on the terms of trade (as well as the positive effect on the protected industries) is most often outweighed by the costs of the tariff to the wider economy brought about by the tariff's distortion of consumption and production incentives. The economic concept of the "optimal tariff" relates to finding the tariff rate that would maximize this favorable effect.

to the lowering of trade barriers between the United States and China could generate a favorable terms of trade effect for the United States.

Industrial Policy

In theory, there can be "special" industries, which, if given government nurturing, will grow to generate large economic returns through sales in domestic and foreign markets. Commercial aircraft and computer software are current industries that may have this attribute. Without this public support, however, these special industries will not emerge or will emerge at too small a scale. While there are many variants of the argument for government promoting particular industries, two have some plausible economic merit. One is support for industries that generate what economists call "positive externalities." This means that the firm's or industry's actions have the potential to generate substantial economic benefits that spill over to other firms or sectors, but none or only a fraction of those benefits can be appropriated by the initiating firm.[8] In this environment, without government support, the firm will not have the incentive to invest in the knowledge-creating process at a level that the whole society would find most economically beneficial.

The likely existence of significant positive externalities is a theoretically valid argument for government support for an industry. In practice, however, it is a problematic endeavor.[9] To be economically effective, such support needs to be targeted at the knowledge that would not otherwise be produced. This is likely a difficult task. Even if the right target is identified, it will be virtually impossible to know what amount of support is called for because these types of activities do not carry a market price from which to judge relative scarcity. A policy of support runs the risk of being too blunt an instrument to just raise economic efficiency, as it is possible that it creates other costly distortions.

The other theoretically valid argument for government promotion of a particular industry is based on the possible existence of "strategic industries." These are industries in which only a very few firms would be able to operate profitably and in which each firm's action will have strong repercussions on the profit potential of other competitors. In this oligopolistic market structure, firms will likely have a significant degree of monopoly power and the potential to earn above normal profits. Capturing a large share of those profits would increase the home nation's economic well-being. In this environment, nations may be tempted to compete for those profits. Without government support, those profits will most likely be appropriated by the first few firms to establish themselves in the industry. Subsequent entry by other firms would be deterred, as they can only expect to incur losses.

Who enters and who is deterred can be influenced by the government of one country making a strategic intervention that gives support with a subsidy sufficient to ensure that its firm will earn a profit whether firms from other nations enter or not. Because any unsubsidized firm would now

[8] The generation of new ideas is often the activity of central economic importance for economic well-being. Yet, because an idea can have limited excludability, it can be difficult for the firm to fully appropriate the economic benefits of the idea it has created. The new idea may easily spill over to benefit other enterprises without compensation accruing to its creators.

[9] For a discussion of the problematic success of industrial policy in practice in several industrial countries, see Paul Krugman and Maurice Obstfeld, *International Economics: Theory and Policy* (New York, Harper-Collins, 1994), pp. 287-296.

earn losses, they will likely be deterred from entry. The government intervention has thereby shifted potential profits from the foreign to the domestic firm and raised economic well-being in the home economy.

Again, while it is conceptually possible for a strategic trade policy to raise national economic well-being, its practical significance has been widely questioned by economists. Perhaps the greatest doubt as to the efficacy of strategic trade policy is that the information required for the government to successfully execute the policy most likely exceeds what would be readily available. Economic theory indicates that the conditions needed for the execution of a successful strategic trade policy are many and that a favorable outcome will be extremely sensitive to small deviations from any of those necessary conditions. This means that pursuing such a policy with substantially incomplete information could easily result in subsidies supporting more inefficiency than efficiency, and leading to more loss than profit.[10]

In addition, economic studies have suggested that even if the policy is well implemented, the realized gains could be very small. For all these reasons, it is unlikely in practice that federal government support of strategic industries would be a viable means for raising the terms of trade and overall economic welfare.[11]

Conclusion

The rapid growth of the Chinese economy over the last decade, accompanied by burgeoning trade with the United States, suggests that there is a large and growing potential for trade with China to have substantial effects on the price of both U.S. imports and exports. The price effects on imports and exports would also indicate that Chinese economic growth is having a significant impact on the U.S. share of the mutual gains from trade with China. Over the past 25 years, including the recent decade during which trade with China began its rapid climb, the United States' overall terms of trade has shown no sustained trend, up or down. Given its current stage of economic development, it seems likely that China's main impact on the U.S. terms of trade over the last decade has been through the price of U.S. imports. The limited data that exist for the price of United States imports from China indicate the transmission of a favorable impulse to the U.S. terms of trade.

Over the near term, it also seems likely that the impact of the economic growth of China on the U.S. terms of trade will continue to be dominated by the favorable effects of falling prices for U.S. imports from China. Over the longer term, conclusions are more tentative. On the one hand, it is certainly likely that with continued successful economic development, China may produce goods that compete with U.S. exports. On the other hand, that successful development will also

[10] Also, if large subsidies are to be handed out without all necessary information available, policy makers can anticipate some politicization of the process and the rising probability that more subsidies will be given than can be analytically justified. Success is likely to be even less tractable if trading partners can be expected to retaliate against a policy that will clearly make them worse off.

[11] For an appreciation of the evolution of thinking about strategic industries and economic policy by a trade economist prominent in the development of the idea, see Paul Krugman, "Is Free Trade Passe?" *Journal of Economic Perspectives* (American Economic Association, Fall 1987), pp. 131-141, and "Does the New Trade Theory Require a New Trade Policy," *The World Economy* (New York, July 1992), pp. 423-441. For a general survey of the issue, see Douglas A. Irwin, *Against the Tide: an Intellectual History of Free Trade* (Princeton University Press, 1996), pp. 207-216.

likely see the growth of a huge domestic market with a rapidly rising demand for foreign goods and services, including many from the United States.

Some deterioration of the U.S. terms of trade may be the unavoidable consequence of successful economic development in large emerging economies, such as China (as well as India, Russia, and Brazil), that leads to some added competition with U.S. exports. The economic benefit to the world economy emanating from such large numbers of people accomplishing the transformation from poverty to a steadily rising standard of living is not something the United States has an interest in forestalling, and may warrant the cost of some modest deterioration of the United States' gains from trade.

However, there is no evidence of any significant trend of deterioration in the U.S. terms of trade for more than 25 years, despite substantial economic growth in the rest of the world (including many emerging economies) over this period. This suggests that the United States has the ability to maintain the competitiveness of its exports in a rapidly changing world economy. This ability is probably rooted in the United States' capacity to be a dynamo of economic innovation. The open, steady flow of new ideas and an open, flexible market economy are a potent combination for fostering economic innovation.

Despite the power and agility of the private market, economic policy likely can *indirectly* have a positive influence the economy's terms of trade. This can occur as a beneficial by-product of an array of policies that compensate for areas of *market failure* and support an *economic infrastructure* that furthers the economy's ability to generate innovation and sustained economic growth. These policies will raise the probability (but certainly not ensure) a favorable terms of trade effect emerging from economic growth in the rest of the world.

Relevant policies would likely include macroeconomic policies that minimize economic instability and raise the incentive for economic agents to undertake the forward-looking activities of investment and innovation; policies that give focused public support to knowledge-producing activities (such as education and scientific research) that may be undervalued and under-produced by the private market; and continued initiatives to lower trade barriers at home and abroad. In this way, terms of trade gains would likely be seen as emerging from a process that increases the gains to each trading partner (although not necessarily equally), and not as a zero-sum game in which the United States' gain is a loss to other nations.

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