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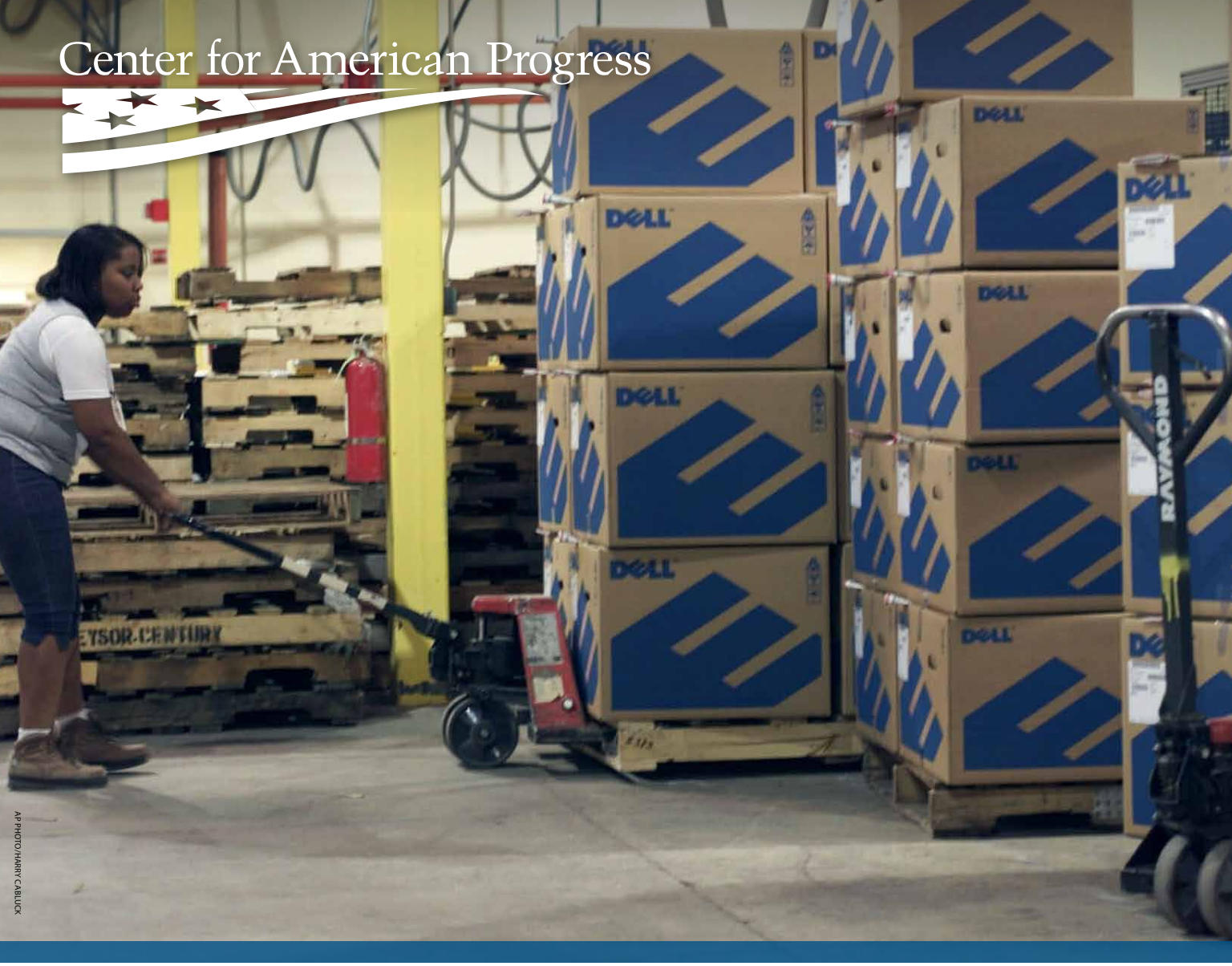


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# The Case for Strategic Export Promotion

## Addressing a Persistent U.S. High-Tech Trade Deficit

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# Contents

# Introduction and summary

The United States faces enormous economic obstacles in the immediate future as it recovers from the worst economic downturn since the Great Depression. The private-sector recovery is under way, with industrial production growing by 9.2 percent from June 2009 to July 2010, and with business investment up by an inflation-adjusted 5.2 percent from June 2009 to June 2010. Private-sector employment is also on the rise with more than 1.1 million jobs created in 2010.[1]

This is good news, but large challenges still loom that could derail the fledgling private-sector momentum contributing to our economic recovery. An important challenge is the trade deficit. The U.S. trade deficit is widening again, reaching 3.7 percent of gross domestic product (the total amount of goods and services produced in our economy) in the third quarter of 2010, up from 2.4 percent of GDP in the second quarter of 2009. This widening gap poses a drag on economic growth since the country has to borrow money overseas to pay for the extra imports—a debt that ultimately will have to be repaid.

A country can only import more than it exports if overseas investors lend it money. For the United States this means a persistent trade deficit requires taking on ever more foreign debt to pay for the excess of imports over exports. That's why maintaining U.S. international economic competitiveness and strengthening our exports must be a key component of any serious strategy to produce sustained and long-term economic growth.

One key measure of U.S. competitiveness is the strength of our high-technology manufacturing industries. High-tech products are high value-added products from industries that produce goods such as aircraft, telecommunications equipment, and pharmaceutical products—all of which depend both on skilled labor, modern machinery, and continual investments in research and development to remain on the cutting edge. The United States in the 1990s maintained a competitive edge in these industries, exporting more of these products than it imported while the rest

of U.S. trade showed a growing deficit. That U.S. high-tech trade surplus illustrated the strength of U.S. trade in these industries at the time, but that competitive edge began to slip as we entered the 21st century.

The United States has been running a consistent and increasing deficit in high-tech goods since 1999. This is an alarming development. A widening U.S. high-tech trade deficit raises doubts about the strength of long-term U.S. economic growth. In contrast, a shrinking high-tech trade deficit or a return to a surplus may bode well for higher living standards in the future. Why? Because the production and export of high-tech goods shows how competitive and innovative the U.S. economy is right now.

Innovation is key to U.S. competitiveness because it leads to the development of new products, services, and processes in a market. Innovation is thus at least in part associated with high-technology industries such as telecommunications, biotechnology, advanced materials, and life sciences. The impact of more innovation can ripple throughout the economy as productivity rises, wages and living standards increase, and economic growth strengthens. The effect of competitive high-tech industries thus goes beyond helping to lower the overall U.S. trade deficit. A thriving high-tech manufacturing industry can boost U.S. growth well into the future.

The United States needs to remain as competitive as possible to address many of the looming challenges of the 21st century. A more competitive country with faster growing innovation will have an easier time reducing structural budget deficits and helping families rebuild lost family incomes and wealth, among other benefits. But the overall impact of newly developed products goes far beyond the products themselves as new industries develop and spur productivity.

The Department of Commerce estimates that technological innovation is linked to three-quarters of the United States's post-World War II growth rate. An innovative economy also brings along with it good jobs. Innovative businesses can use new technology to develop products more rapidly, boosting profits and wages. The average compensation per employee in innovation-intensive sectors increased 50 percent between 1990 and 2007, almost 2.5 times the national average.[2]

Pursuing policies that could boost innovation is thus not only about addressing the current threat to the fledgling recovery, but also about ensuring that the recovery will be strong and durable. But neither will happen if U.S. policymakers don't

get serious about the high-tech trade deficit. And one of the first steps toward doing so is to understand how our high-tech products fare in world markets compared to our top competitors among industrialized nations.

This report analyzes the U.S. high-tech trade balance and compares it to other large, industrialized economies—specifically the seven largest industrialized economies that comprise the Group of Seven industrialized democracies: the United States, Japan, Germany, Great Britain, France, Italy, and Canada—from 1990 through 2008 to show a number of important high-tech trade trends that can inform policy discussions over the future of U.S. high-tech trade. In the pages that follow we will detail the trends summarized here, among them:

- The United States still remains the largest exporter of high-technology manufactured goods among major industrialized economies. In 2008, 32.5 percent of high-tech exports of all G-7 nations came from the United States. The United States has a solid foundation from which to grow its export base in these high-innovation goods.

- U.S. high-tech imports have exceeded U.S. exports consistently since 1999. The U.S. high-tech trade deficit subsequently widened to 0.6 percent of gross domestic product in 2004 and the following years. Between 2000 and 2008 U.S. imports grew by 4.2 percent a year, while U.S. high-tech exports grew by just an average 3 percent during that period, leading to an ever-wider trade deficit.

- The growth of U.S. high-tech exports and imports slowed after 1999. U.S. high-tech imports had grown at an average rate of 11.8 percent a year during the business cycle of the 1990s, from 1990 to 1999—7.6 percentage points faster than between 2000 and 2008.[3] U.S. high-tech exports slowed from an annual growth rate of 9.6 percent from 1990 to 2000 to 3 percent between 2000 and 2008.[4] The slowdown in U.S. import growth was thus more pronounced than the slowdown in U.S. export growth. A further slowdown in U.S. imports below the growth rate of exports will hence be hard to accomplish, making an acceleration of U.S. high-tech export growth the primary policy goal.

- A number of other large industrialized economies have high-tech trade surpluses. France, Germany, and Japan exported more high-tech goods than they imported in 2008.

- All G-7 countries have large bilateral high-tech trade deficits with China. France, Germany, and Japan are able to overcome these deficits with surpluses with other countries to generate an overall positive high-tech trade balance. This is particularly relevant for the United States, which shows its largest bilateral trade deficit with China, about four times the size of the high-tech trade deficit with any other nation in 2008.

- The G-7 industrialized economies that have strong high-tech trading ties to just a few other countries tend to see overall high-tech surpluses. The United States, in contrast, has much more diffuse high-tech trade relationships, which seem to be associated with an overall high-tech trade deficit.

- The G-7 countries with high-tech trade surpluses—France, Germany, and Japan—have more than one highly competitive industry with a substantial high-tech trade surplus. The United States has only one highly competitive broad industry category—the manufacturing of aircraft.[5]

These trends show two important things that should inform policy. First, U.S. high-tech exports still remain strong but are overshadowed by more rapidly growing imports. The policy goals are consequently to build on the existing strengths of U.S. high-tech exports, while finding ways to diminish U.S. high-tech imports. Second, the experiences of France, Germany, and Japan may point the way of how to accomplish this. All three of these large industrialized economies have bilateral high-tech deficits with China, as the United States does, but they manage to generate high-tech trade surpluses with the rest of the world to arrive at an overall high-tech trade surplus.

The loss of global high-tech competitiveness is thus not a foregone conclusion for the United States. The need for policy action to strengthen the country's global competitiveness is further highlighted by signs that productivity growth—the rate at which existing industries innovate—may slow in the next decade or so. Business investment has been comparatively low since the end of the previous business cycle in early 2001. Productivity growth follows business investment trends with some time lag. The slowdown in investment, notwithstanding the current economic recovery, could thus translate into slower productivity growth in the future.[6] This could make it harder for the United States to turn the corner in its trade balance, particularly in high-tech trade. And this is why our analysis and our recommendations are important for policymakers to consider in the coming months.

# The rising U.S. high-tech deficit

High-tech manufactured goods are products that are high value-added and are the result of technological innovation. These include products such as pharmaceuticals, telecommunications equipment, high-end computers, and many goods produced by the aerospace industries. (See Table 1) High-tech manufacturing also requires a skilled and innovative workforce. Jobs in the high-tech sector have been good, high-paying jobs as well.[7] High-tech trade is consequently a key indicator of a country's competitiveness since it reflects investment in research and development, physical infrastructure, and human capital.

## Types of high-tech manufactured goods

### A list of products considered high tech by the Organization for Economic Co-operation and Development

**Aircraft and spacecraft:** airplanes, whether or not motorized, lighter-than-air flying machines, balloons, spacecraft and spacecraft launch vehicles; aircraft launching gear; parts and accessories of the aircraft of this class; major assemblies such as fuselages, wings, doors, control surfaces, landing gear including seaplane floats, fuel tanks, nacelles, etc.; parts of the major assemblies specialized for installation on aircraft; parts of balloons and airships, and parts of spacecraft and launch vehicles.

**Medical precision and optical instruments:** medical appliances and instruments and appliances for measuring, checking, testing, navigating and other purposes; optical instruments and photographic equipment; watches and clocks.

**Office, accounting, and computing machinery:** typewriters, photo-copying apparatus; hand held or desk-top electronic calculating machines; other calculators; accounting machines, cash registers, complete digital systems comprising a central processing unit, an input unit, and an output unit; digital systems which include peripheral units such as additional input/output units, additional storage units; magnetic or optical readers; machines for transcribing data onto data media in coded form; machines for processing data, decoding, and giving the result in clear.

**Pharmaceuticals:** pharmaceutical preparations for human or veterinary use; surgical dressings, medicated wadding, fracture bandages, catgut, and other prepared sutures; chemical substances used in the manufacture of pharmaceuticals: antibiotics, endocrine products, basic vitamins; opium derivatives; sulpha drugs; serums and plasmas; salicylic acid, its salts and esters; glycosides and vegetable alkaloids; chemically pure sugar.

**Radio, television, and communication equipment:** electronic valves and tubes and other electronic components; television and radio transmitters and apparatus for line telephony and line telegraphy; television and radio receivers, sound or video recording or reproducing apparatus, and associated goods.

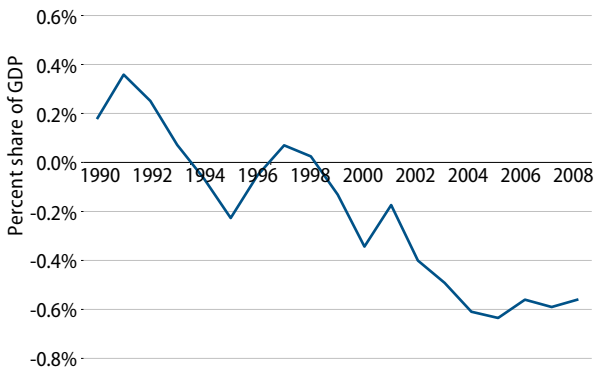
Source: The Organization for Economic Co-operation and Development, comprised of the world's leading industrialized nations.

The United States, though, has seen its high-tech balance turn increasingly negative, starting in 1999, following the total U.S. trade balance with a lag of almost twenty years. The U.S. high-tech balance went from a surplus of 0.4 percent of GDP in 1991 to a deficit of 0.6 percent of GDP in 2008. (See Figure 1) The United States started to run a consistent high-tech trade deficit in 1999. This deficit went from 3.3 percent of the total trade deficit in 1999 to 9.3 percent of the total trade deficit in 2008, suggesting that the deterioration in high-tech trade has been faster than the deterioration in other U.S. trade.

**FIGURE 1**

**From surplus to deficit**

U.S. high-tech trade balance as a share of GDP




Source: Organization for Economic Co-Operation, "STAN Bilateral Trade Database" (2010).

The data we examined to chart this trend extend one year past the onset of the Great Recession, which started in December 2007. This extra year of data is important because a recession should result in a shrinking trade deficit since U.S. importers have fewer needs for imports. The onset of economic weaknesses after 2007 indeed led to a small improvement in the high-tech trade balance relative to GDP, but the change in the high-tech balance was smaller than after the previous two recessions, with 0.03 percentage points relative to GDP compared to 0.2 percentage points after the recession that started in the summer of 1990, and 0.2 percentage points after the recession that started in March 2001.

The impact of the Great Recession, then, on the high-tech trade balance seems to have been milder than the impact of earlier recessions, which suggests that there may be structural problems that prevent regularly recurring decreases of the trade deficit during the most recent recession. This conclusion is further supported by the fact that, even after the trade balance improvements following the previous two recessions, the decline in the U.S. high-tech trade balance quickly resumed.

This trend toward ever larger high-tech trade deficits after each of the last three recessions is evident in the growing weakness of many of our exports in global markets compared to our leading competitors among the G-7 countries. To this we now turn.

# International comparison emphasizes increasing U.S. weaknesses

The U.S. high-tech deficit occupies a particular spot among the high-tech trade balances of other large, industrialized economies. The United States is the only country other than Great Britain that had a growing trade deficit in 2008 compared to 2000.[8] The five other large industrialized economies (Canada, France, Germany, Italy, and Japan) either showed high-tech trade surpluses, improving balances, or both.

Three G-7 countries had high-tech surpluses in 2008. Germany, Japan, and France had trade surpluses in 2008, with Germany having the largest surplus as a share of GDP at 0.8 percent. Japan's surplus in 2008 was 0.7 percent while France's was 0.3 percent. Great Britain, Italy, and Canada all had high-technology goods deficits with 0.8 percent, 0.9 percent, and 1.7 percent of GDP respectively, all exceeding the size of the U.S. high-tech trade deficit. (See Figure 2)

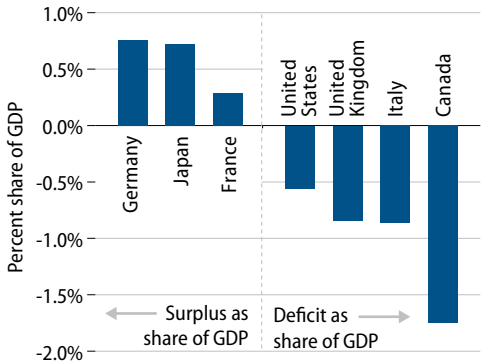
The good news, of sorts, is that the U.S. high-tech deficit could be worse, considering the data for other large, industrialized economies. The problem, though, is that the high-tech trade balance weakened for the United States and three other G-7 countries from 2000 to 2008. France, Japan, and the United Kingdom also show deteriorating high-tech trade balance. Canada, Germany, and Italy, in comparison, have experienced improving high-tech trade balances from 2000 to 2008. (See Table 2)

Canada, for instance, had the largest high-tech deficit as a share of GDP, at negative 1.7 percent in 2008, but it also saw considerable improvement after 2000, shrinking by 0.4 percentage points as a share of GDP between 2000 and 2008. This interna-

FIGURE 2

## Middle of the pack

The U.S. high-tech trade deficit compared to other Group of 7 industrialized democracies




Source: Organization for Economic Co-Operation, "STAN Bilateral Trade Database" (2010).

TABLE 2

## Slipping down the rankings

The U.S. high-tech trade balance nears the bottom among the seven largest industrialized nations

| Country, sorted by change | Change in high-tech trade balance as share of GDP, 2000-2008 |
|---|---|
| 1.Germany | 0.9% |
| 2. Canada | 0.4% |
| 3. Italy | 0.2% |
| 4. France | -0.1% |
| 5. United States | -0.2% |
| 6. United Kingdom | -0.5% |
| 7. Japan | -0.6% |

Notes: All figures are percentage point differences. Authors' calculations based on Organization for Economic Co-operation and Development, "STAN Bilateral Trade Database" (2010).

tional comparison shows that only the United States and the United Kingdom had both high-tech deficits in 2008 and deteriorating high-tech trade balances from 2000 to 2008.

## U.S. high-tech exports weaken from position of comparative strength

The weakening of the U.S. high-tech trade balance after 1999 occurred from a position of relative strength among other large, industrialized economies. A closer look at U.S. high-tech exports in particular highlights both strengths and weaknesses. The good news is that the United States still has a disproportionate share of high-tech exports among G-7 countries. The bad news is that the United States's pronounced position in high-tech exports weakened after 2000. The rise in the U.S. high-tech trade deficit thus coincides with slowing U.S. high-tech exports.

U.S. high-tech exports still remain in a comparatively strong position among G-7 countries in 2008. The United States is the largest high-tech exporter among the G-7 countries. Moreover, U.S. high-tech exports still contribute a disproportionate part to total U.S. goods exports. U.S. high-tech exports amounted to 26.8 percent of total goods trade in 2008, compared to an average of 17.9 percent for all G-7 countries.[9]

This also means that U.S. high-tech exports play a substantial and disproportionate role in high-tech exports among the G-7 countries. U.S. high-tech exports accounted for 32.5 percent of G-7 high-tech exports in 2008, down from 36.1 percent in 2000, but up from 30.1 percent in 1990. This is a substantially larger share than in non-high tech trade, where the U.S. share stood at 21 percent in 2008, down from 23.6 percent, and up from 19.2 percent in 1990.[10] The United States consequently still has a stronger competitive position in high-tech industries than in other goods industries, although its share of high-tech exports among the G-7 countries is shrinking.

The bad news, though, is that increases in U.S. high-tech exports have weakened as Table 2 highlights. U.S. high-tech exports expanded by an average of 3 percent each year from 2000 to 2008, including a 3 percent gain in the first year of the global recession that started in the United States at the end of 2007.[11] This is a substantial slowdown from the 1990s, when U.S. exports grew by an annual average of 9.6 percent. And, non high-tech goods exports rose by 7.9 percent—more than two and a half times the growth rate of high-tech exports—after

accelerating from an average growth rate of 6.3 percent between 1990 and 2000. U.S. high-tech exports are still expanding, but their growth rate has slowed while other trade has accelerated. The upshot: High-tech exports are shrinking as a share of total U.S. exports.

The slowdown in U.S. high-tech export growth points toward a structural, competitiveness problem and not other macroeconomic factors, such as a high value of the U.S. dollar in the 1990s and its slipping value in the 2000s. Yet our nation's deteriorating high-tech trade balance occurred when the U.S. dollar weakened in the 2000s, while it strengthened in the 1990s against the foreign currencies of other industrialized economies.

Many factors, of course, influence international trade in high-tech products. Chief among them are demand and prices. Demand for U.S. high-tech products relative to those of other countries among industrialized economies will depend on the relative competitiveness of U.S. products and how expensive or cheap they are. Global demand, though, expanded both in the 1990s and the 2000s. U.S. exports, outside of high-tech products, actually increased faster than high-tech exports, highlighting this slip in demand growth for high-tech products through 2008.

Another point to consider is that the nature of high-tech products has changed over time. Many of the goods that were considered high-tech manufactured goods in 1990 probably no longer are high-tech goods, while many high-tech goods in 2008 did not exist or at least were not produced for mass markets in 2008. We thus concentrate on comparatively broad aggregate categories, rather than smaller subcategories. The aggregation allows for substantial changes in the composition of an industry over time while still permitting us to draw some comparisons over time.

We feel particularly comfortable with our comparisons over time since the conclusion of a falling high-tech trade balance—rising deficits—does not depend on the specific definition of high-tech trade. Two separate data sources, the OECD and the U.S. Census Bureau, show very similar trends, although the magnitude of high-tech trade balances varies between the two data sets, as we discuss in the appendix (see Figure A-1 on page25). The U.S. Census Bureau in particular accounts for the changing nature in high-tech products and aggregate industries at any given point in time that are considered high-tech at that point in time. The data trends from the U.S. Census Bureau, though, do not differ much from those shown in the OECD data, which we use here to arrive at international comparisons.

More importantly, though, is the comparison between countries in a given year. Competitiveness after all measures how well the United States fares in the global high-tech market place at any given point in time. A U.S. high-tech deficit indicates that we are not competitive in high-tech industries in the aggregate. Again, this conclusion holds for several of the most recent years based on two separate data sets.

What's more, U.S. high-tech exports should have grown at least as fast as other exports to other industrialized member nations of the OECD where managed exchange rates linked closely to the U.S. dollar and other free floating currencies may have been more of an issue, such as South Korea, Singapore, and Malaysia. The laggard growth of U.S. high-tech exports thus likely illustrates a structural problem.

The slowdown in U.S. high-tech exports has been accompanied by a similar slowdown in U.S. high-tech imports. (See Table 2) The declining U.S. high-tech import share for all 26 member nations of the OECD is explained by much slower high-tech U.S. import growth after 2000 than before. U.S. high-tech imports expanded by an annual average of 4.2 percent from 2000 to 2008, compared to an annual growth rate of 11.8 percent from 1990 to 2000. U.S. high-tech imports, though, still grew faster than U.S. high-tech exports after 2000, leading to a widening high-tech deficit.

**TABLE 2**

## Growing reliance on high-tech imports

Changes in U.S. high-tech exports and imports, relative to OECD countries, 1990 to 2008

| Exports | Average annual growth, 1990 to 2000 | Average annual growth, 2000 to 2008 |
|---|---|---|
| U.S. high-tech exports (based on nominal dollar amounts) | 9.6% | 3.0% |
| U.S. non-high tech exports (based on nominal dollar amounts) | 6.3 | 7.9 |
| U.S. high-tech exports as share of G-7 high-tech exports | 0.6 | -0.5 |
| U.S. non-high tech exports as share of G-7 high-tech exports | 0.4 | -0.3 |
| **Imports** | | |
| U.S. high-tech imports (based on nominal dollar amounts) | 11.8 | 4.2 |
| U.S. non-high tech imports (based on nominal dollar amounts) | 8.1 | 7.5 |
| U.S. high-tech imports as share of G-7 high-tech imports | 0.9 | -0.4 |
| U.S. non-high tech imports as share of G-7 high-tech imports | 1.1 | -0.6 |

Source: Organization for Economic Co-operation and Development, "STAN Bilateral Trade Database" (2010).

The data on U.S. high-tech exports and imports point the way for policy. The goal will have to be to strengthen U.S. high-tech exports rather than to slow U.S. high-tech imports. Additional data breakdowns by regions of the world and by industrial sector as well as international comparisons in the subsequent sections of this report further underscore this point.

Why prioritize export growth over slowing imports? Simple arithmetic and economics speak for a policy focus on export promotion rather than efforts to import reduction. First, U.S. high-tech import growth already slowed more on average than export growth over time—even though U.S. high-tech imports still grew faster than U.S. high-tech exports after 2000, leading to a widening high-tech deficit. U.S. high-tech import growth fell by 7.6 percentage points from the 1990s to the 2000s, compared to a decline of 6.4 percentage points for U.S. high-tech export growth. A further slow-down in U.S. import growth, necessary to shrink the trade deficits, seems difficult to accomplish since U.S. import growth has already slowed down substantially.

Second, U.S. high-tech import growth would have to fall well below U.S. high-tech export growth just to keep the trade deficit stable, never mind shrink it. High-tech imports at this point are greater than U.S. high-tech exports. The most likely time for imports to see a substantial drop is during a recession. U.S. high-tech import growth indeed slowed to 1.8 percent from 2007 to 2008, but that was much higher than the 12.6 percent decrease from 2000 to 2001. This suggests that there may be a structural obstacle to faster declines in import growth at this point, such as a large dependence on imported high-tech capital goods, like advanced information technology hardware.

Third, the U.S. economy is growing again, and with this growth comes a renewed appetite for imports as the periods immediately following previous recessions showed—when U.S. high-tech import growth resumed and the U.S. high-tech trade balance deteriorated again. That's probably why the United States sees a consistent deficit in audio and video equipment.

Fourth, U.S. policymakers have more tools at their disposal to influence the competitiveness of U.S. industries compared to tools for lowering the competitiveness of overseas industries. Among these tools are research-and-development tax credits, tax credits for green technologies, finance enhancements such as loan guarantees and interest subsidies for high-tech start-up companies, and training of skilled workers in U.S. manufacturing through apprenticeships and college level courses, to name just a few.

Fifth, many imports are still necessary inputs into the U.S. production process, particularly for high value-added manufacturing.[12] Consider that the United States had a $23.8 billion trade deficit in pharmaceuticals in 2008 because the United States spends more on health care than any other country in the world.

Lastly, U.S. consumers and firms tend to already have a substantial appetite for imports, larger than the demand by foreigners for U.S. exports.[13] Faster growth in the United States, which we hope will occur in the coming years, will thus automatically translate into a widening trade deficit. U.S. imports are more sensitive to changes in U.S. growth than U.S. exports are to changing growth overseas. The goal for trade policy has thus long been to change the appetite of importers in other countries for U.S. made products.

Many policies can help to accelerate U.S. export growth and slow U.S. import growth, such as a lower value of the dollar. But other policies target one or the other, such as research and development credits to expand high-tech industries in the United States which could boost high-tech exports, while punitive tariffs on things like steel products target imports. In these instances, the data suggest a greater need for policy attention for high-tech export promotion since there is only limited room to reduce U.S. high-tech import growth.

Data on international comparisons further underscore this point and offer some insights on where other large, industrialized economies have found ways to expand their high-tech export base. To this we now turn.

# U.S. high-tech exports are globally less concentrated than U.S. high-tech imports

The question, then, is how other large, industrialized economies handle high-tech trade to see if there are any clear markers that could point the way for faster U.S. high-tech export growth. We first present some data on the countries that explain the U.S. high-tech deficits to illustrate in which geographical regions of the world U.S. high-tech trade balance has the greatest need for improvement. We specifically present data on the total trade balance in 2008.

We then show the ratio of U.S. high-tech imports to U.S. high-tech exports for five countries with the largest U.S. high-tech deficits—China, Mexico, Malaysia, Japan, and Ireland. This shows the relative gap in high-tech trade. A ratio of less than 100 percent indicates a trade surplus (imports are smaller than exports) and a ratio of more than 100 percent indicates a trade deficit. The key to understanding this data is that the United States may have a large bilateral trade deficit with one country, either because imports and exports are seriously off-balance or because the country is very large. A large absolute trade balance may translate into a comparatively small ratio of exports to imports if the country, and U.S. trade with that country, is very large. This means it may be possible to shrink a large absolute gap by reducing imports relatively a little or increase exports comparatively a little if the country in question is relatively large.

Finally in this section of the paper we present the shares of high-tech exports and high-tech imports out of total U.S. high-tech exports and imports to each of the five large deficit countries to show how important changes in U.S. exports to and imports from one country could be for shrinking the overall U.S. high-tech trade deficit.

## The five countries with the largest high-tech trade surpluses with the United States

The countries with which the United States has the largest high-tech trade imbalances in 2008 were China, Mexico, Malaysia, Japan, and Ireland. (See Table 3) The United States has both the largest absolute and relative gap with China, with

a high-tech trade deficit totaling $96 billion in 2008 and high-tech imports at almost six times the level of high-tech exports. The biggest high-tech deficit with China comes from office accounting and computing machinery, with U.S. imports surpassing U.S. exports by $51.9 billion in 2008 alone. The absolute and relative gaps are substantially smaller for the remaining four countries.

**TABLE 3**

### The five biggest high-tech importers to the United States

Rankings based on these nation's bilateral trade surpluses in 2008

| Country, sorted by trade balance, from smallest to largest | High-tech deficit in 2008[14] | Ratio of U.S. imports to U.S. exports | Share of U.S. high-tech exports | Share of U.S. high-tech imports |
|---|---|---|---|---|
| 1. China | -$96.0 | 573.5 | 5.8 | 27.1 |
| 2. Mexico | -$20.6 | 176.4 | 7.8 | 11.1 |
| 3. Malaysia | -$14.3 | 270.4 | 2.4 | 5.3 |
| 4. Japan | -$10.1 | 145.5 | 6.3 | 7.5 |
| 5. Ireland | -$9.7 | 262.3 | 1.7 | 3.7 |

Notes: Dollar figures are in billions. All other figures are percent. Authors' calculations based on Organization for Economic Co-operation and Development, "STAN Bilateral Trade Database" (2010).

Table 3 also shows the relative importance of bilateral trade flows for all five of these countries. Mexico, for instance, has the single largest share of U.S. high-tech exports, with 7.8 percent, followed by Japan (6.3 percent) and China (5.8 percent). At the other end of the scale, high-tech exports to Ireland account for only 1.7 percent of U.S. high-tech exports. The import story is different since high-tech imports are more concentrated than U.S. high-tech exports. High-tech imports from China make up 27.1 percent of all U.S. high-tech imports, followed by 11.1 percent from Mexico, and 7.5 percent from Japan.

These data imply several relevant policy conclusions. First, the bilateral high-tech trade deficit with China is the single largest source of high-tech imbalances and it is also the hardest high-tech trade imbalance to shrink since imports and exports are relatively speaking so far apart. Shrinking the trade gap with China thus poses not only the single largest absolute challenge but also the single largest relative challenge.

The United States runs large and persistent deficits in all high-tech industries except aircraft and spacecraft with China, with the largest deficit coming from office accounting and computing machinery. In 2008, the United States exported $2.15 billion worth of these goods to China but imported $54 billion. The story is similar for other high-tech industries. With telecommunications equipment,

the United States exported $8.3 billion to China but imported $51.3 billion. And with medical precision and optical equipment, $3.8 million worth of goods were exported compared to $8.3 billion worth of imports. Comparatively, the largest U.S. high-tech deficit industries with other Group of Seven economies never result in a U.S. deficit larger than $10 billion in the same year.

Second, high-tech imports are more concentrated among countries that run recurring high-tech trade deficits, such as the United States, than are their high-tech exports to other countries.[15] Growing U.S. exports will thus require either a very heavy lift with a few countries or require a broad-based effort across a wide range of trading partner countries.

Third, it may be comparatively easy to reduce the high-tech trade deficit with some countries with which the United States has large high-tech deficits. Take Mexico, for instance, where the absolute difference between imports and exports amounted to $20.6 billion in 2008. U.S. imports, though, were only 76.4 percent greater than U.S. high-tech exports—a far cry from the 473.4 percent gap for China or the 170.4 percent gap with Malaysia. Export growth with countries such as Japan and Mexico could pay off quickly for U.S. high-tech trade since exports would grow from a relatively large base. How U.S. policymakers could do that is the subject of the next section of this paper.

# U.S. high-tech trade exports spread across industries

We undertake a similar discussion for the United States by examining its high-tech sector. Table 4 shows our summary data. The sectoral data highlight a few important facts. First, there is really only one large sector that shows a substantial surplus, aircraft and spacecraft. Reduction of the U.S. high-tech trade deficit will thus require some attention to the other four large high-tech trade categories—radio, TV, and communications equipment; office accounting and computing machinery; pharmaceuticals; and medical precision and optical instruments. Not all subcategories of these four broad industries will lend themselves to policies that could enhance their future growth prospects, which will make it even more important that policymakers quickly identify policies that could boost the most promising high-tech industries.

Second, the gap between imports and exports in the largest deficit category—radio, TV, and communication equipment, is comparatively manageable. Another way of saying this is that U.S. exports in this category are fairly large, making up 36.3 percent of total U.S. high-tech exports. Growing exports in this critical sector could thus help to make a substantial dent in the U.S. high-tech trade deficit.

**TABLE 4**

**The U.S. high-tech trade deficit by sector in 2008**

Categories based on OECD definitions of high-tech products

| Sector, sorted by trade balance, from smallest to largest | High-tech deficit in 2008 | Ratio of U.S. imports to U.S. exports | Share of U.S. high-tech exports | Share of U.S. high-tech imports |
|---|---|---|---|---|
| 1. Radio, TV, and communication equipment | -$62.4 | 167.2 | 36.3 | 26.7 |
| 2. Office accounting and computing machinery | -$57.8 | 221.6 | 24.6 | 13.7 |
| 3. Pharmaceuticals | -$23.8 | 157.8 | 15.2 | 11.8 |
| 4. Medical precision and optical instrument | $6.0 | 91.8 | 15.7 | 21.1 |
| 5. Aircraft and spacecraft | $57.8 | 37.9 | 8.2 | 26.7 |

Notes: Dollar figures are in billions. All other figures are percent. Authors' calculations based on Organization for Economic Co-operation and Development, "STAN Bilateral Trade Database" (2010).

Third, U.S. sectoral high-tech imports are less concentrated than U.S. sectoral exports—just the opposite of the breakdown by regions of the world. Increasing exports thus will require either a relatively small increase in large export sectors, or a heavy lift across a number of smaller export sectors.

## High-tech trade is more concentrated in surplus countries than in deficit countries

The basic picture of the U.S. high-tech deficit is one of regional concentration around the world and of sectoral diffusion. We present similar data for other large, industrialized countries in the next section to identify similarities and differences, particularly with countries that show a high-tech trade surplus and with those who have seen improvements in their high-tech trade balance.

We summarize the three smallest high-tech trade balances (largest deficits) for all G-7 countries in Table 5. Adding a larger number of bilateral trading partner countries does not improve the information and makes the table too unwieldy. We present the same summary figures as we did for the United States in Table 3—absolute trade balance, ratio of imports to exports, share of exports, and share of imports for each industry. We then add a measure of trade concentration by reporting the number of trading partner countries that make up at least half of all exports or half of all imports.

Our table reproduces the data for the United States to make comparisons easier. The countries after the United States are listed in descending order of high-tech trade balances. The first three countries—Germany, Japan, and France—have high-tech trade surpluses, while the remaining three countries—Great Britain, Italy, and Canada—all have high-tech trade deficits. The U.S. high-tech trade deficit is the median for 2008, splitting the sample in half.

The summary data show a few important lessons for the United States. First, the large absolute trade deficits with China, which exist in all G-7 countries, don't necessarily translate into an overall high-tech deficit. All three surplus countries after all show large deficits with China. The bilateral high-tech trade deficit with China is in fact the largest deficit in each case. The United States could thus be able to overcome its large absolute deficit by expanding high-tech trade surpluses or shrinking high-tech surpluses outside of its trade with China.

Second, a large relative difference between imports from China and exports to China is a predictor of a country being a deficit country. Great Britain has the smallest ratio of imports from and exports to China of any deficit country, with 472.3 percent. Germany, in comparison, has the largest ratio of imports from China to exports to China, at 411.7 percent. The policy-relevant lesson here is that a smaller relative gap seems to make it easier for countries to manage their overall high-tech trade balance, even if trade with China shows a large absolute high-tech trade deficit because high-tech imports from and high-tech exports to China are relatively close.

The United States's relative overall trade imbalance with China needs to shrink to give the United States some breathing room to get its high-tech trade deficit under control. China's decision to let its currency appreciate may be an important step to bring U.S. high-tech imports to U.S. high-tech exports closer together or at least in slowing the growth of the U.S. high-tech deficit.

Third, high-tech trade surplus countries tend to be more concentrated in their export activities than the United States. U.S. high-tech exports to eight countries make up at least half of all high-tech trade, compared to three countries for Germany, four for Japan, and eight for France. Much of the export growth is to neighboring countries in the case of Germany and Japan. Four out of the five largest German high-tech export receiving countries are France, Belgium/Luxembourg, the Netherlands, and Italy, with the United States rounding out the top five. The United States is the largest importer of Japanese high-tech exports, followed by China, Taiwan, and South Korea. Canada and Mexico are among the largest importers of U.S. high-tech products, but their export shares are relatively small compared to those that Germany and Japan manage to generate with countries in their regions.

Part of this may be explained by the differences in size between the economies of the United States, Canada, and Mexico, but even Germany manages to generate substantial trade with comparatively small neighbors, such as Belgium, the Netherlands, and Luxembourg. The data indicate that countries with stronger high-tech trade in their regions tend to have smaller deficits or even high-tech trade surpluses.

Fourth, surplus countries tend to have more concentrated high-tech imports than deficit countries. Two countries explain more than 50 percent of imports in Germany and Japan, and four countries explain more than half of all imports

in France. Five countries, though, make up at least half of all imports in the three remaining deficit countries—Great Britain, Italy, and Canada. A higher concentration of imports may make it easier for a country to manage the economic factors determining its high-tech imports.[16]

**TABLE 5**

## China is every G-7 country's problem

Summary of three smallest bilateral high-tech trade balances for G-7 countries, 2008

| Trading partner country, sorted by rank | High-tech deficit in 2008 | Ratio of high-tech imports to high-tech exports | Share of high-tech exports | Share of high-tech imports |
|---|---|---|---|---|
| United States | | | | |
| 1. China | -$96.0 | 573.5 | 5.8 | 27.1 |
| 2. Mexico | -$20.6 | 176.4 | 7.8 | 11.1 |
| 3. Malaysia | -$14.3 | 270.4 | 2.4 | 5.3 |
| No. of countries explaining at least half of all high-tech exports/imports | | | 8 | 4 |
| **Surplus countries** | | | | |
| Germany | | | | |
| 1. China | -$24.0 | 411.7 | 3.1 | 14.6 |
| 2. Ireland | -$15.8 | 1128.0 | 0.6 | 8.0 |
| 3. Japan | -$11.3 | 371.1 | 1.7 | 7.1 |
| No. of countries explaining at least half of all high-tech exports/imports | | | 3 | 2 |
| Japan | | | | |
| 1. China | -$8.1 | 128.1 | 18.4 | 30.4 |
| 2. Switzerland | -$2.8 | 555.0 | 0.4 | 2.8 |
| 3. Ireland | -$2.1 | 906.1 | 0.2 | 1.9 |
| No. of countries explaining at least half of all high-tech exports/imports | | | 4 | 2 |
| France | | | | |
| 1. China | -$9.2 | 259.6 | 4.5 | 12.5 |
| 2. United States | -$7.5 | 155.4 | 10.6 | 17.6 |
| 3. Ireland | -$3.8 | 416.1 | 0.9 | 4.2 |
| No. of countries explaining at least half of all high-tech exports/imports | | | 8 | 4 |
| **Deficit countries** | | | | |
| United Kingdom | | | | |
| 1. China | -$8.6 | 472.3 | 2.2 | 8.5 |
| 2. Netherlands | -$7.1 | 207.8 | 6.3 | 10.8 |
| 3. United States | -$6.9 | 134.6 | 19.0 | 21.0 |
| No. of countries explaining at least half of all high-tech exports/imports | | | 6 | 5 |
| Italy | | | | |
| 1. Netherlands | -$8.4 | 590.2 | 3.6 | 15.0 |
| 2. Germany | -$4.8 | 193.0 | 10.8 | 14.7 |
| 3. China | -$4.8 | 686.6 | 1.7 | 8.2 |
| No. of countries explaining at least half of all high-tech exports/imports | | | 6 | 5 |
| Canada | | | | |
| 1. China | -$10.8 | 2033.5 | 1.4 | 17.1 |
| 2. Mexico | -$4.1 | 556.3 | 2.2 | 7.5 |
| 3. Japan | -$2.5 | 585.9 | 1.3 | 4.5 |
| No. of countries explaining at least half of all high-tech exports/imports | | | 1 | 4 |

Source: Authors' calculations based on OECD (2010)

## Surplus countries do more than one thing well

Bilateral trade relations are one part in thinking strategically about high-tech trade. The other part is an analysis of sectoral breakdowns. This will give us a sense of whether other countries are more or less likely than the United States to concentrate on a few select industries. U.S. high-tech surpluses, for instance, are concentrated in one industry, while its deficits are spread over three large industry categories.

We summarize high-tech trade by sectors in Table 6. We present the same summary measures as before—the absolute trade balance, the ratio of imports to exports, the share of high-tech exports, and the share of high-tech imports for each industry. We present a complete list of all five high-tech industries and thus dispense with the additional concentration measure that we used in Table 5, the number of countries that explain at least half of all high-tech exports or imports.

The data present a few basic lessons. First, the three surplus countries show surpluses in at least two, if not three sectors, out of five. Germany and Japan have three surplus sectors, while France has only two (although one deficit sector, the medical precision and optical machinery, has a comparatively small deficit). The three deficit countries have at least three and sometimes four deficit sectors.

The United States is actually the only deficit country with only three deficit sectors, although its surplus in medical precision and optical instruments is small compared to its remaining sectoral balances. The implication is that the United States needs to expand its surplus in medical and optical instruments and focus on turning at least one of the deficit sectors into a surplus sector.

Second, strong surplus countries focus on two sectors that can strongly contribute to their surplus because they have a clear competitive advantage in them. There is, for instance, little overlap in the surplus sectors of the surplus countries. Germany's leading industry is medical precision and optical instruments, Japan's leading industry is radio/TV communications equipment, and France's largest surplus is in aircraft and spacecraft. Both Italy and Canada, in comparison, list aircraft and spacecraft as their only surplus categories, and it is a somewhat distant second for Great Britain.

One implication may be a concentration on key industries that are not very large in trading partner countries. The case of the German and French pharmaceutical industries, which rank second in both countries, may give pause here, but a

closer look actually supports the conclusion. The difference between France and Germany is that the relative drop-off from the largest surplus (medical precision and optical instruments) to the second-largest surplus (pharmaceuticals) is much less pronounced, with 22.7 percent in Germany than in France's 68.7 percent drop-off from airspace and spacecraft to pharmaceuticals. Germany consequently ends up with a high-tech trade surplus that is more than twice as large relative to GDP than France's. Japan, which shows a surplus similar to Germany's, also has two leading industries. The implication thus holds that countries with sizeable high-tech surpluses rely on two competitive high-tech industries.

Third, the two leading industries often contribute a sizeable share to exports in all countries. There is little difference in the concentration of sectoral exports between surplus and deficit countries. We consider, for example, the standard deviation (a statistical measure of how spread-out numbers are) of the export shares. The standard deviation of the sectoral export shares range from 6.3 percent to 11.6 percent in surplus countries, and from 7.1 percent to 12.2 percent in deficit countries. This suggests no clear difference in the concentration of exports shares.

There is also no clearly discernable difference in the concentration of imports between surplus and deficit countries. We calculate that the standard deviation of the sectoral import shares ranges from 2.8 percent to 13 percent in the surplus countries, and from 4.1 percent to 10.8 percent in the deficit countries. These figures further support our earlier conclusion that the United States needs to identify at least two industries that can grow their competitive advantage. Currently, the United States relies too heavily on just one industry, aircraft and spacecraft, with medical precision and optical instruments playing a distant second role.

TABLE 6

## How to compete in high-tech trade sectors: Boast surpluses in two or more categories

Summary of sectoral high-tech trade balances for G-7 countries in 2008

| Trading partner country, sorted by rank | High-tech balance in 2008 | Ratio of high-tech imports to high-tech exports | Share of high-tech exports | Share of high-tech imports |
|---|---|---|---|---|
| United States | | | | |
| Aircraft and spacecraft | $57.8 | 37.9 | 8.2 | 26.7 |
| Medical precision and optical instrument | $6.0 | 91.8 | 15.7 | 21.1 |
| Pharmaceuticals | -$23.8 | 157.8 | 15.2 | 11.8 |
| Office accounting and computing machinery | -$57.8 | 221.6 | 24.6 | 13.7 |
| Radio, TV. and communication equipment | -$62.4 | 167.2 | 36.3 | 26.7 |
| **Surplus countries** | | | | |
| Germany | | | | |
| Medical precision and optical instruments | $25.5 | 125.7 | 23.9 | 15.2 |
| Pharmaceuticals | $19.7 | 82.1 | 28.5 | 23.1 |
| Aircraft and spacecraft | $4.6 | 87.4 | 14.8 | 14.6 |
| Office accounting and computing machinery | -$9.9 | 130.2 | 13.3 | 19.5 |
| Radio, TV. and communication equipment | -$12.3 | 125.7 | 19.5 | 27.6 |
| Japan | | | | |
| Radio, TV. and communication equipment | $36.3 | 57.9 | 55.0 | 41.1 |
| Office accounting and computing machinery | $13.7 | 99.4 | 15.9 | 20.3 |
| Medical precision and optical instruments | $12.5 | 66.0 | 23.5 | 20.0 |
| Aircraft and spacecraft | -$5.6 | 232.2 | 2.7 | 8.1 |
| Pharmaceuticals | -$8.0 | 270.8 | 3.0 | 10.4 |
| France | | | | |
| Aircraft and spacecraft | $22.7 | 50.4 | 36.0 | 19.4 |
| Pharmaceuticals | $7.1 | 79.4 | 27.2 | 23.1 |
| Medical precision and optical instruments | -$0.9 | 104.3 | 15.1 | 18.0 |
| Radio, TV. and communication equipment | -$9.9 | 157.3 | 13.6 | 22.8 |
| Office accounting and computing machinery | -$11.0 | 221.3 | 7.1 | 16.8 |
| **Deficit countries** | | | | |
| United Kingdom | | | | |
| Pharmaceuticals | $10.9 | 67.2 | 31.7 | 17.5 |
| Aircraft and airspace | -$0.8 | 103.0 | 24.5 | 20.8 |
| Medical precision and optical instruments | -$1.6 | 108.8 | 16.9 | 15.2 |
| Office accounting and computing machinery | -$13.8 | 215.1 | 11.6 | 20.5 |
| Radio, TV. and communication equipment | -$17.0 | 206.2 | 15.3 | 26.0 |
| Italy | | | | |
| Aircraft and airspace | $3.2 | 49.8 | 13.3 | 4.7 |
| Medical precision and optical instruments | -$1.4 | 111.1 | 26.4 | 20.7 |
| Pharmaceuticals | -$4.1 | 122.9 | 37.0 | 32.2 |
| Office accounting and computing machinery | -$7.9 | 404.9 | 5.4 | 15.6 |
| Radio, TV. and communication equipment | -$9.6 | 213.5 | 17.8 | 26.8 |
| Canada | | | | |
| Aircraft and spacecraft | $3.3 | 75.8 | 34.9 | 15.6 |
| Pharmaceuticals | -$5.3 | 116.3 | 15.5 | 17.4 |
| Medical precision and optical instruments | -$6.1 | 199.7 | 15.1 | 18.3 |
| Office accounting and computing machinery | -$8.9 | 185.2 | 10.3 | 19.7 |
| Radio, TV. and communication equipment | -$9.2 | 19.06 | 25.1 | 29.1 |

# Conclusion

In this paper we considered the evidence of U.S. high-tech trade in an international context. The United States's high-tech trade balance turned from surpluses to deficits at the end of the 1990s, or about 15 years after other trade turned to deficits. This reflects the leading role that high-tech trade has played since it shows that high-tech manufacturing could maintain its competitive advantage longer than other industries. Yet the fact remains—the United States now runs annual high-tech trade deficits, too.

Reviving high-tech trade competitiveness will be crucial in restoring economic growth and stability for the United States. High-tech manufacturing creates high value-added products that can help to reduce the large, looming overall U.S. trade deficit. It is also a locus of well-paying jobs that can help to contribute to more economic security for many American families, if the challenges ahead are taken seriously.

There are several results from the data. First, the United States is still a remarkably large exporter of high-tech trade products. This is a strong foundation to build on. Second, growing high-tech exports should be a priority over reducing high-tech imports if the goal is to reduce the U.S. high-tech trade deficit. U.S. high-tech import growth has already slowed a lot more than growth in high-tech exports. It seems unrealistic to expect high-tech import growth to slow much further.

Third, high-tech trade deficits with China are no insurmountable obstacle to being globally competitive. High-tech trade with China is a challenge for all large, industrialized economies. Still, three out of seven of the world's largest industrialized economies show overall high-tech surpluses even though they also have high-tech trade deficits with China.

Fourth, the U.S. high-tech trade relationships are much more diffuse than those of other large, industrialized economies that show high-tech trade surpluses. It requires a serious evaluation to see if this is an obstacle to reducing the U.S. high-

tech deficit. The United States may find that it makes sense to focus its high-tech export efforts on a few strategically valuable countries.

Fifth, successful high-tech trade surplus countries—particularly Germany and Japan, and to a lesser degree, France—rely on two globally competitive industries to generate a high-tech surplus, but there is little overlap in the high-tech industries where these surplus countries generate surpluses. The United States hence needs to go its own way since success seems to depend on not duplicating what other large, industrialized economies are doing.

A reduction of the high-tech trade deficit will only be possible if policymakers take the data seriously and engage strategically in the high-tech trade arena. Our results help to identify the need for new strategic thinking on international competitiveness and innovation. Additional research is clearly needed to see how other large, industrialized economies have managed to strategically build up key industries and key trading partner countries to generate sizeable high-tech trade surpluses. Analyses of Germany's and Japan's innovation policies should be a first place to start.

# Appendix A: Methodology

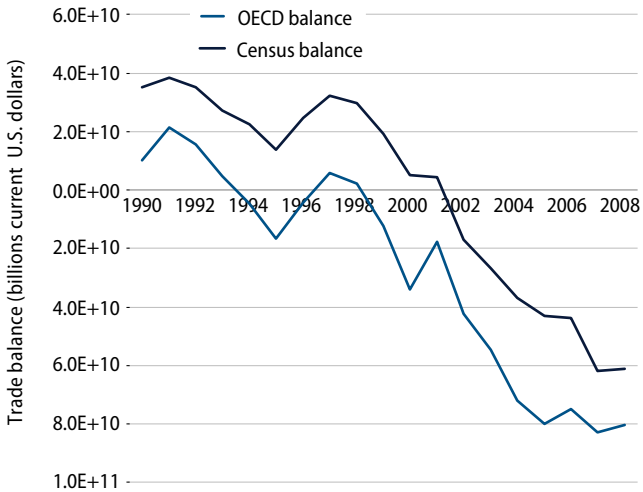
There are a variety of sources to measure trends in the trading of high-technology manufactured goods. In addition to the OECD series we use for this paper, the United States Census produces a series called Advanced Technology Products. This series, part of its Foreign Trade Statistics, provides a more detailed breakdown of individual manufactured products. By individually selecting products at a granular data, the Census series provides perhaps a more nuanced view of the state of the high-tech industry.

Overall the OECD uses a more inclusive definition of "high-tech goods" and uses broader categorical definitions. As a result of the different categorization the absolute values of exports and imports of high-technology products are far greater in the OECD series versus the Census series. Additionally the OECD data series provides more opportunity to look at trade flows from country to country, whereas the Census series is more limited.

The trends we describe in this paper are the same no matter what series one uses. Figure A-1 shows the high-tech trade balance for the OECD and the Census datasets. The absolute levels are different, with OECD including more manufactured goods in its definition of a high-technology product, but the trend remains the same. High-tech trade has declined overall.

**FIGURE A-1**

**Census vs. OECD high-tech trade balance**

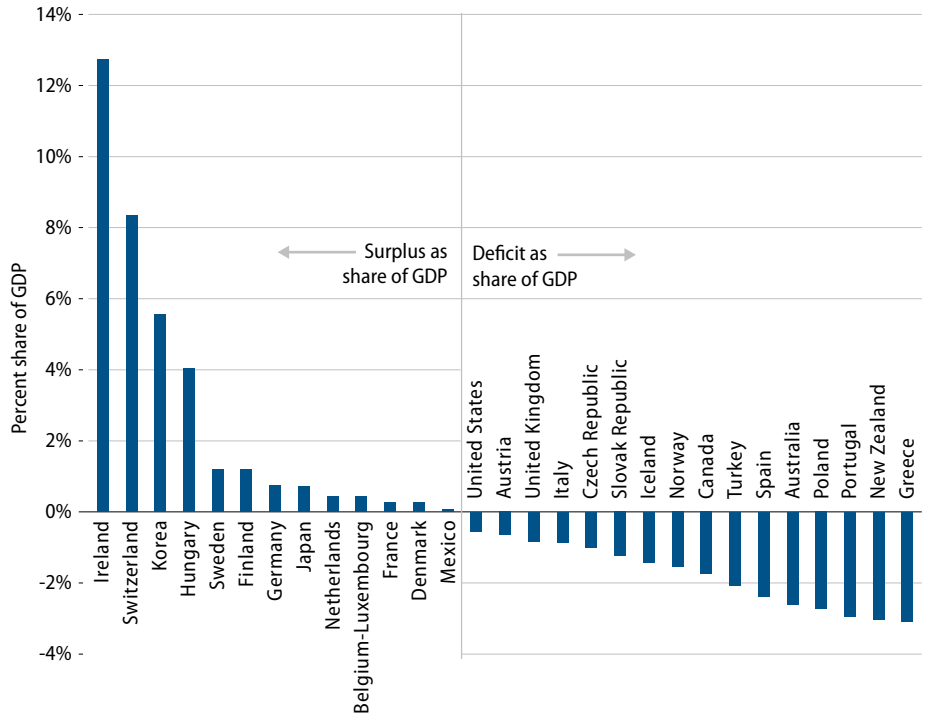



Source: Calculations based on Organization for economic co-operation and Development, "STAN Bilateral Trade Database" (2010); U.S. Census, "Foreign Trade Statistics" (2010).

# Appendix B: High-tech trade rankings for all OECD countries

**FIGURE B-1**

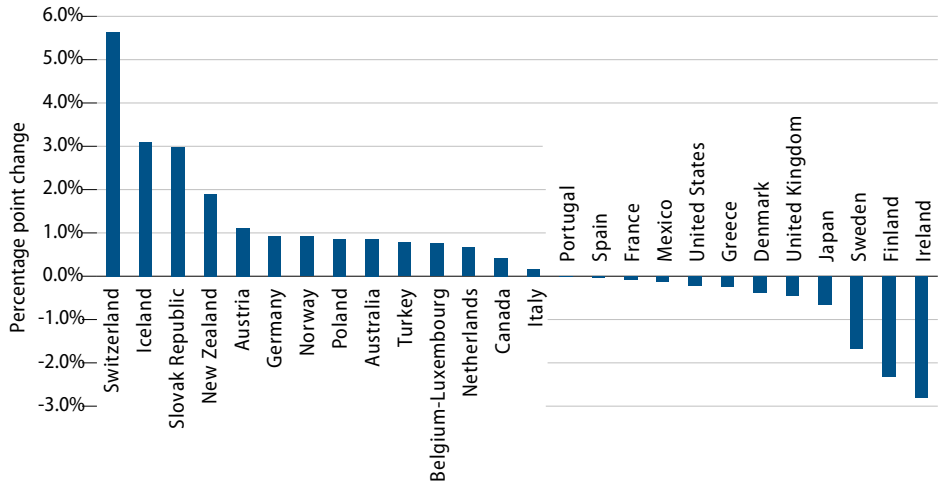
**High-tech trade balance surplus/deficit as a share of GDP, OECD nations, 2008**




Source: Organization for economic co-operation and Development, "STAN Bilateral Trade Database" (2010).

FIGURE B-2

## Percentage point change in high-tech trade balance, all OECD Countries, 2000–2008




Source: Organization for economic co-operation and Development, "STAN Bilateral Trade Database" (2010).

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# Endnotes

1 Authors' calculations based on Board of Governors, Federal Reserve System, "Release G.17 Industrial Production and Capacity Utilization" (2010);, Bureau of Economic Analysis, "National Income and Product Accounts" (2010); and Bureau of Labor Statistics, "Current Employment Statistics" (2010).

2 Arti Rai, Stuart Graham, and Mark Doms, "Patent Reform: Unleashing Innovation, Promoting Economic Growth and Producing High-Paying Jobs" (Washington: Department of Commerce, 2010), available at http://2001-2009.commerce.gov/s/groups/public/@doc/@os/@opa/documents/content/prod01_009147.pdf.

3 The latest year of available data is 2008.

4 We choose these years to roughly coincide with the U.S. business cycle. We do not separate out the recession from 2007 to 2008 due to the limited data that are available. Our conclusions are not sensitive to the specific dates, i.e. our conclusions still hold if we stop the analysis in 2007 instead of 2008.

5 U.S. manufacturers hold competitive advantages in a number of smaller subcategories. Those competitive advantages are dwarfed by the high-tech deficits in other subsectors, reflected in aggregate high-tech trade deficits. The United States differs here from other large industrialized economies as it has only one large aggregate category that shows a high-tech trade surplus, whereas other large industrialized economies have two or more broad high-tech industry categories that show trade surpluses. The relevant question after all is how a country fares in its aggregate competitiveness and not just in a few isolated instances, if we are concerned with the future growth prospects for U.S. living standards.

6 Christian E. Weller and Amanda Logan, "Investing for Widespread, Productive Growth" (Washington: Center for American Progress, 2008).

7 Arti Rai, Stuart Graham, and Mark Doms, "Patent Reform: Unleashing Innovation, Promoting Economic Growth and Producing High-Paying Jobs" (Washington: Department of Commerce, 2010), available at http://2001-2009.commerce.gov/s/groups/public/@doc/@os/@opa/documents/content/prod01_009147.pdf.

8 We use 2000 as the comparison point since it is the last year before the last U.S. recession and since it is close to the start of consistent high-tech deficits, which started in 1999. The starting point does not influence our conclusions.

9 Authors' calculations based on Organization for Economic Co-operation and Development, "STAN Bilateral Trade Database" (2010)..

10 Authors' calculations based on OECD data.

11 Authors' calculations based on OECD data.

12 Christian Weller, "The U.S. Trade Trap" (Washington: Center for American Progress, 2010).

13 Catherine Mann and Katharina Plueck, "The U.S. Trade Deficit A Disaggregated Perspective." Working Paper No. 05-11 (Peterson Institute for International Economics).

14 Note that because this is just top 5 bilateral trade partners, figures will not add up to 100 percent.

15 This is true, even when we consider all trading partner countries in 2008. The single largest share of high-tech exports went to Canada and amounted to 10.6 percent. Authors' calculations based on Organization for Economic Co-operationOrganization for economic co-operation and Development, STAN Bilateral Trade Database, Paris, France: OECD, 2010 Organization for Economic Co-operation and Development, "STAN Bilateral Trade Database."

16 This is not an arithmetic fluke, whereby deficit countries import more than surplus countries in absolute terms. Germany has larger imports than Canada, Italy, and the United Kingdom. France and Japan have more imports than Canada or Italy. The size of imports thus does not determine the concentration of imports.

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