Economic Policy Institute

Briefing Paper

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THE CONSEQUENCES OF FAILING TO DEVELOP A STRONG HDTV INDUSTRY IN THE US

by Robert Cohen*

The US could face an annual trade deficit of more than $225 billion in electronics and lose more than two million jobs a year by 2010 if it fails to develop strong HDTV and flat-display screen industries. The trade deficit under a weak HDTV scenario, where the US industry takes only ten percent of the world market, would be $227 billion in the year 2010 for just four electronics industries: HDTV receivers and VCRs, personal computers, semiconductors and automated manufacturing equipment. The main contributors to this enormous trade deficit would be the personal computer and semiconductor industries, which would suffer estimated deficits of $114 billion and $76 billion, respectively.

As a result of this trade deficit, the US would lose 792,000 jobs in these four closely linked industries, since weakening the HDTV base weakens demand and technical innovation in the other electronics sectors. An additional 1.5 million jobs would be lost through the loss of spending in the economy by people who would have been employed in these electronics sectors. These multiplier effects are based on a rather conservative estimate of approximately two new jobs for every new one in electronics.

As these figures show, our nation stands at a critical juncture. If we do not create a strong industrial base centered on development of HDTV

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*This report is taken from a larger study-in-progress, Telecommunications Policy and the Emergence of High Definition Television, to be published by the Economic Policy Institute.

and flat-display screen technology, it will not only weaken our industrial base, but also reduce the numbers of skilled jobs that are needed to make us more competitive.

LINKAGES: ONE KEY TO CREATING COMPETITIVENESS

Why would our failure to develop a strong HDTV industry have such a dramatic impact on the trade balance and job creation? Because the HDTV and flat-display screen technologies are intimately linked, economically, to the improvement of our personal computer and automated manufacturing industries, which are likely to expand at a rapid pace during the next two decades. These linkages--through which improvements and expansion in one electronics sector stimulate improvements and expansion in others--are critical to the future development of our industrial base.

When a personal computer adopts the kind of flat display screen associated with HDTV technology, it will not only create additional demand for the products associated with this new industry, but it will also require a large number of semiconductors to support the new projector and display technology that will be incorporated in the screen itself. The use of these inputs will give a boost to demand for products from these related industries, contributing to increases in their output and improving the chances that they will be profitable and have the funds to support further innovation.

These linkages create a kind of feed-back mechanism that provides its greatest advantages to our industrial base when the entire "food chain" of the electronics industry is improved. This will occur when the demand for basic components, such as semiconductors and digital display screens, is expanded to a wide range of applications of the final products in our economy. HDTVs will be used in the home, as display screens for personal computers, and by the nation's businesses to improve controls over automated production in auto, steel and manufacturing plants, to integrate video and print media in newspapers, and for the collection and

transmission of important medical results. such as x-rays and computer tomographs.

THREE SCENARIOS FOR US ELECTRONICS INDUSTRIES, 1990-2010

So strong are the linkages in the electronics "food chain" that industry experts believe they can project US production and market shares in both upstream and downstream industries, based on various scenarios for the introduction and success of an emerging technology such as HDTV. This study bases its estimates of trade and employment impacts in the year 2010 on production and US market share scenarios developed in a study recently released by the American Electronics Association. The underlying data from that study are shown in the Appendix Table.

According to the AEA study, the Strong scenario represents a case where 50 percent of the US market for HDTV is controlled by US firms. In the Medium Scenario, 30 percent of this market is controlled by US firms, and in the Weak Scenario only 10 percent of the US market is controlled by US firms. According to these unadjusted estimates, with a strong HDTV base, the US PC industry would attain an estimated $221 billion in sales, in contrast to an expected $110 billion in sales with a weak HDTV sector, a difference of $111 billion in foregone sales if the US has a weak HDTV base. The contrast is almost as striking for the semiconductor industry. In this sector, sales would reach an estimated $124 billion with a strong US HDTV sector and only an estimated $62 billion with a weak HDTV industry, a difference in 20 10 of $62 billion in semiconductor sales.

These figures are adjusted in Table 1 using estimates for how much of the total US market share would be produced in the US (as opposed to US owned offshore facilities). This permits us to create projections for US based production under each of the three scenarios for the year 20 10. These estimates can be used with projections of total US sales to compute the trade surplus or deficit that would be expected under each scenario in 20 10. As can be seen in Table 1, the differences between the Strong and

Weak HDTV scenarios are striking, particularly for the personal computer and semiconductor industries. In the case of the PC industry, US production would reach an estimated $176 billion in 20 10. while it would only be an estimated $44 billion under the weak HDTV Scenario. For semiconductors, US production would grow to an estimated $ 99 billion under the Strong HDTV scenario but only $25 billion under the Weak HDTV scenario.

While these differences are quite large, they are not surprising. If the US HDTV industry generates little local production and only a small amount of innovation in electronics products, it is very likely that even the largest US companies will obtain many of their components overseas, earning profits by the value added that they gain from assembling the components into a computer or automated manufacturing equipment.

Table 2 sums up the trade impacts of the different scenarios in 20 10. It shows that the trade balance in these four industries would range from an estimated surplus of $10 billion to an enormous estimated deficit of $227 billion in just one year. The main contributors to this deficit would be the personal computer and semiconductor industries, which would contribute deficits of $114 billion and $76 billion, respectively, to the overall trade deficit under the Weak HDTV scenario.

Employment impacts can be obtained by dividing the sales figures in Table 1 by the amount of sales that we would expect these industries to have per employee. There are currently about $150,000 in sales for each employee in the computer and telecommunications industry in 1987. However, we used an estimate of $300,000 in sales per employee, allowing for substantial productivity gains by the year 2010. If productivity does not rise rapidly the employment losses shown in Table 3 are understated.

According to these estimates, the personal computer industry will grow to 588,000 employees in 2010 under the strong HDTV industry scenario, compared to just 147,000 employees under the weak HDTV scenario. a difference of just under 450,000 jobs. A similar difference in estimated

employment gains can be expected in the semiconductor industry, where 331,000 jobs will be created in 2010 under the strong HDTV industry scenario, while just 83,000 jobs will exist under the weak HDTV base option.

Table 3 also allows us to compare the total estimated employment levels in all four industries that will be reached under each scenario in 2010. The differences are quite substantial. Under the Strong HDTV scenario, there will be nearly 1.1 million estimated jobs in these four industries, but only 274,000 jobs under the Weak HDTV scenario.

This means that the US *will* forego *more than* three quarters of a million jobs in 2010 *if* it develops a weak *HDTV* industry compared to a strong one.

Furthermore, these large job creation differences between the scenarios underestimate the total effect of not having a strong HDTV industry because the figures in Table 3 do not include any multiplier effects that would be likely to occur. Using a conservative multiplier, it would be reasonable to argue that at least another 1.5 million jobs will be foregone in 20 10 by not developing a strong HDTV industry. Moreover, if flat-screen displays were used extensively in retailing, in education, or in automated automobile assembly, direct job creation would be greater than we have estimated for the four sectors, and multiplier effects would be proportionately larger. These estimates also fail to allow for new industries that might emerge as a result of the commercial development of digital television, digital communications and innovative flat-screen displays between now and the year 2010.

Table 1

ADJUSTED ESTIMATES OF US PRODUCTION
OF HDTV RECEIVERS, HDTV VCRs,
AND OTHER ELECTRONICS SECTORS AFFECTED BY
THE GROWTH OF HDTV
Three Growth Scenarios, 2010

(Billions of Dollars)

Sector	US Market	Strong HDTV	Medium HDTV	Weak HDTV
HDTV Receivers & HDTV VCRs	$ 11	$ 4.3	$ 2.0	$ 0.4
Automated Manufacturing Equipment	$ 39	$ 40.0	$ 24.4	$ 13.0
Personal Computers	$ 158	$176.4	$105.8	$ 44.1
Semiconductors	$ 101	$ 99.4	$ 59.7	$ 24.8

Source: These figures include adjustments that assume that for the Strong Scenario, 50 percent of the US manufacturers share is produced in the US and an additional 30 percent comes from foreign owned production in the US. For the Medium Scenario, the figures are 40 percent and 20 percent, and for the Weak Scenario, the figures are 30 percent and 10 percent. These adjustments are used to alter the estimates for world share of production by US firms in David Russell, "High Definition Television (HDTV): Economic Analysis of Impact," Report of the American Electronics Association ATV Task Force Economic Impact Team, November 1988.

Table 2

ESTIMATED TRADE DEFICITS IN 2010
FROM THE US PRODUCTION OF
HDTV RECEIVERS, HDTV VCRs AND ELECTRONICS PRODUCTS
THAT ARE AFFECTED BY THE GROWTH OF HDTV
Three Growth Scenarios

(Billions of Dollars)

Sector	Strong HDTV	Medium HDTV	Weak HDTV
HDTV Receivers & HDTV VCRs	- 7	- 9	-11
Automated Manufacturing Equipment	+ 1	-15	-26
Personal Computers	+18	-52	-114
Semiconductors	- 2	-41	-76
Total	+10	-117	-227

Source: These figures assume that for the Strong Scenario, 50 percent of the US manufacturers share is produced in the US and an additional 30 percent comes from foreign owned production in the US. For the Medium Scenario, the figures are 40 percent and 20 percent, and for the Weak Scenario, the figures are 30 percent and 10 percent. These adjustments are used to alter the estimates for world share in David Russell, "High Definition Television (HDTV): Economic Analysis of Impact," Report of the American Electronics Association ATV Task Force Economic Impact Team, November 1988.

Table 3
ESTIMATED EMPLOYMENT IN THE PRODUCTION OF
HDTV RECEIVERS, HDTU VCRs AND ELECTRONICS PRODUCTS
THAT ARE AFFECTED BY THE GROWTH OF HDTV
Three Growth Scenarios, 2010

(Thousands of Jobs)

Sector	Strong HDTV	Medium HDTV	Weak HDTV
HDTV Receivers & HDTV VCRs	148	7	1
Automated Manufacturing Equipment	133	81	43
Personal Computers	588	353	147
Semiconductors	331	199	83
Total employment	1066	640	274

Source: These figures assume that for the Strong Scenario, 50 percent of the US manufacturers share is produced in the US and an additional 30 percent comes from foreign owned production in the US. For the Medium Scenario, the figures are 40 percent and 20 percent, and for the Weak Scenario, the figures are 30 percent and 10 percent. These adjustments are used to alter the estimates for world share in David Russell, "High Definition Television (HDTV): Economic Analysis of Impact," Report of the American Electronics Association ATV Task Force Economic Impact Team, November 1988.

Note: these estimates are based on an assumption of $300,000 sales per employee in contrast to $150,000 for the key parts of the electronics industry in 1987.

CONCLUSION

The US stands at a critical juncture that will shape the growth of its electronics industry well into the next century. Since the new industries of high definition television and flat display screens are likely to have an enormous impact on our electronics industry, the fact that we have lost much of the consumer electronics base may lead some to minimize the impact of the new "digital revolution." But this revolution offers the potential for a dramatic revival of industries that could form the base for the creation of at least two million jobs and for a gain in our trade account of over $225 billion by the year 2010.

Given the strong government role played in promoting the development and commercial success of these industries in Europe and Japan, it is no longer logical for our policies to avoid supporting those industries that are critical to the future growth and development of our industrial base. If we continue to lose the skilled jobs and the innovative spirit of entrepreneurship that has supported the vitality of the US electronics industry since its inception, our economy will be subject to pressures that will cause substantial dislocation of industries and workers as we settle for a position as a "branch plant" economy. But with a revitalized electronics sector, our companies will have the opportunity to regain a leadership position in what have been called the "crown jewel" industries of the future.

APPENDIX Table

WORLD MARKET SALES IN 2010 OF US FIRMS
UNADJUSTED ESTIMATES OF HDTV RECEIVERS AND HDTV VCRs
TOGETHER WITH SALES OF OTHER ELECTRONICS SECTORS AFFECTED BY THE GROWTH OF HDTV
Three Growth Scenarios, 2010

(In Billions of Dollars)

Sector	US Market	Strong HDTV	Medium HDTV	Weak HDTV
HDTV Receivers & HDTV VCRs	$ 11	$ 5.4	$ 3.3	$ 1.1
Automated Manufacturing Equipment	$ 58	$ 48.7	$ 40.6	$ 32.5
Personal Computers	$ 210	$220.5	$176.4	$110.3
Semiconductors	$ 151	$124.3	$ 99.4	$ 62.1

Source: Derived from results presented in David Russell, "High Definition Television (HDTV): Economic Analysis of Impact," Report of the American Electronics Association ATV Task Force Economic Impact Team, November 1988.