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The software industry is a remarkable engine of economic growth around the world and holds tremendous potential for the future. In the past several decades, this industry has grown from infancy to robust maturity, becoming one of the most significant sectors of the global economy, with spillover benefits extending to virtually every corner of the world economy.

Global sales of packaged software reached over $118.4 billion in final sales in 1996, rising to $135.4 billion in 1997, according to estimates made by IDC, a market research company. In the 61 countries covered by this report, the packaged software market reached $117.2 billion in final sales in 1996, rising to $133.9 billion in 1997. Retail sales for PC business software, an important segment of the overall software market, reached $14.1 billion in 1997, according to research conducted separately by the economic consulting firm of Nathan Associates, Inc., for the Business Software Alliance (BSA).

The packaged software industry brings numerous economic benefits to the global economy. In 1996/7 alone, the packaged software industry:

- **Provided** 741,258 jobs, directly and indirectly in the non-U.S. economies covered by this report; and
- **Generated** $21.0 billion in tax revenues, directly and indirectly, in the non-U.S. economies.

In the United States, the broader software industry (including the packaged and custom software industries and certain closely related services):

- **Generated a total of** 619,438 direct jobs and $7.2 billion in direct software industry tax revenues for the U.S. economy. ³
At its projected growth rate, the software industry will:

- Generate packaged software sales of $116.9 billion by 2000/1 for the non-U.S. countries in this report;
- Provide a total of 1,064,720 jobs in the local software and supporting industries for the non-U.S. economies by 2000/1; and
- Contribute $34.0 billion in tax revenues to the governments of the non-U.S. economies by 2000/1.

Few sectors of the global economy can expect to exceed the performance of the software industry. The software industry is the heart of the “Information Society” — that culmination of information technology and communications developments now heralding a new industrial revolution.

“Piracy” is a major impediment to growth in the packaged software industry. Software piracy is the unauthorized production, copying or distribution of copyrighted software products. Estimated 1997 piracy rates for one software market segment, PC business software products, range from a low of 27 percent in the United States to as high as 98 percent in Vietnam. International Planning and Research (IPR) estimates the market value of illegal copying of PC business software at $11.4 billion worldwide in 1997. As piracy also occurs in other software market segments, the total market losses attributable to all pirated software are considerably higher. PricewaterhouseCoopers LLP (“PricewaterhouseCoopers”) estimates that reducing piracy to benchmark levels could produce as much as an additional 771,201 jobs and $22.9 billion in tax revenues for the non-U.S. economies covered in this report by 2000/01 in addition to the forecast market growth. For the U.S. economy, if piracy were eliminated altogether, Nathan Associates estimates that the industry could have produced an additional 216,000 direct and indirect jobs and $1.6 billion in tax revenues across the entire U.S. economy by 2005.

This study reviews the employment, and tax benefits in 61 countries as a result of the packaged software industry, and the additional benefits it could gain through a reduction of piracy levels. Our major findings are summarized below.

1.1 The Software Industry is an Engine of Job Creation

The packaged software industry presently provides well over a million jobs worldwide with just under half of these jobs in the United States. This number is expected to grow substantially in the future. The packaged software industry accounted for:

- 741,258 non-U.S. jobs in 1996/7, through which
- 115,635 people were employed directly by packaged software publishers and developers in such areas as research and development, marketing, sales and service;
- 430,007 people were employed in downstream jobs in such areas as supply, distribution, training and technical support related to packaged software; and
- 195,616 people were employed in jobs supported indirectly by the packaged software industry through business and employee purchases and tax payments.

These figures exclude jobs in custom software development and sales, which may be of a similar order of magnitude.

- In addition, the broader software industry (as earlier defined) accounted for 619,438 U.S. direct software industry jobs in 1996.
Over the forecast period, the packaged software industry is expected to create over 71,000 new jobs every year, on average, outside the United States. Should piracy rates fall to the benchmark levels used in our analysis, this rate can be expected to rise to over 127,000 new jobs per year, on average (these jobs include a variety of different types of positions with software publishers, plus upstream and downstream job and multiplier effects). In the United States, the broader software industry (as earlier defined) is expected to create an average of 45,700 new jobs each year through 2005. If piracy were to be eliminated altogether in the United States, the number of new software jobs created would double to an average of 93,000 a year.

This report assumes that employment grows at half of the average growth rate predicted for packaged software sales. This growth will yield 323,463 additional direct and supporting jobs by 2000/1, providing employment for a total of 1,064,720 people for the non-U.S. economies. For the U.S. economy, Nathan Associates estimates that direct employment should reach 1,030,500 jobs by 2005.

Many of these jobs are in highly skilled and highly paid areas such as research and development, manufacturing and production, sales, marketing, professional services, custom programming, technical support and administrative functions. Manufacturing, sales, and marketing of such “high-tech” products require substantial training and technical expertise. Technical support requires intimate familiarity with the functions and operations of the publishers’ software products. In the U.S., software industry workers enjoy more than twice the average level of wages across the entire economy — $57,319 versus $27,845, according to the Nathan Associates report.

While this report calculates employment figures for direct, downstream and upstream activities supported by the packaged software industry, it does not estimate the number of people working in positions directly related to the purchase and maintenance of software at “end-user” organizations. Accurate data of this sort is difficult to gather because in-house IT employment is not identified as such in statistics about the end-user community. As a result, the employment estimates in this report are considered conservative.

### 1.2 The Software Industry Makes Substantial Contributions to Government Revenues

Burgeoning economic activity and job growth increases government revenues. In 1996/7, the packaged software industry contributed substantially to governments’ revenues. The fiscal contribution of the packaged software industry in 1996/7 comprised:
$21.0 billion in government revenues for the non-U.S. economies, of which
$11.0 billion was related to taxation of corporate earnings, consumption taxes on sales and other fiscal levies such as import duties; and
$10.0 billion was generated through taxation of industry suppliers and taxes on employee income and expenditures; and
$7.2 billion in tax revenues for the U.S. economy in 1996.

The revenue-growth forecast for the packaged software industry over the next several years will result in higher fiscal contributions. Assuming a growth in fiscal contributions proportional to the market growth rate for packaged software, the industry could contribute a total of $34.0 billion to government revenues for the non-U.S. economies in 2000/01.

1.3 Software Theft Constrains Economic Growth

Effective legislative and enforcement action to reduce illegal copying of software could dramatically accelerate job growth and increase tax revenues from the packaged software industry.

International Planning and Research (IPR) estimates that 40 percent of the PC business software used or sold worldwide in 1997 was pirated, with a market value of $11.4 billion. These losses are a serious constraint on the growth of the industry, inhibiting job creation, adversely affecting investment decisions and limiting the development of software products in regions where piracy is prevalent. Piracy is a pervasive problem for other software categories as well.

Experience shows that legal protection of software, combined with strong enforcement and increased public awareness, results in a dramatic reduction in illegal copying. Curbing illegal copying could significantly accelerate job growth and increase tax revenues from the packaged software industry. As reflected in Figure 1.2, if world governments had reduced software piracy rates in 1996/7 to certain benchmark levels, direct and indirect employment would have increased by 521,663 jobs, and tax revenues by as much as $13.7 billion in 1996/7 alone for the non-U.S. economies. In addition to market growth, this translates into an industry that could create, throughout the economy, jobs that employ 1,835,921 people and generate $56.9 billion in tax revenues by 2000/01 for the non-U.S. economies. For the U.S. economy, reducing piracy would have generated an additional 130,000 jobs and nearly $1.0 billion in tax revenues in 1996, according to the Nathan Associates report. By 2005, according to this report, the elimination of piracy in the U.S. could provide an increase, on top of projected growth, of an additional 216,000 jobs and $1.6 billion in tax revenues throughout the economy.

Figure 1.2 Curtailing Piracy Would Generate Significant Benefits — Especially in Higher Piracy Markets Outside the U.S.
CHAPTER TWO

INTRODUCTION

This report provides an overview of the economic activity, employment and tax benefits that countries around the world presently enjoy as a result of their indigenous packaged software industry. At the same time, the summary reviews the substantially increased benefits that these countries could gain through a reduction in their software piracy levels. This summary encompasses the economies of North America, Latin America, Western Europe, and selected countries in Eastern Europe, Africa/Middle East and the Asia-Pacific regions.

This study was conducted during 1996-98 by an international team of professionals from PricewaterhouseCoopers LLP, and was commissioned by the Business Software Alliance (BSA), a non-profit association of leading software and information technology companies. Members of the BSA are listed in Appendix III. Data for the United States was provided by the economic consulting firm of Nathan Associates Inc., which was commissioned by the BSA to examine the U.S. market.

The scope of the investigation included all kinds of packaged software that is developed for multiple customers of all types and runs on various types of computers. We investigated the economic activity directly associated with the development, distribution and sale, and after-sales service of packaged software, including the “multiplier effects” created by the employment, tax contributions and other spending of the packaged software industry. PricewaterhouseCoopers developed economic models of the software market and its linkages to other parts of the economy using estimates of the size of domestic software sales in the base year and forecasted period to chart the extent of the actual and potential economic contributions at current and reduced piracy rates.

Although packaged software has become a ubiquitous part of everyday life, the industry is still so young that it is easy to overlook just how significant a part of the global economy it has become. Due to its size, growth rate and contribution to the performance of all sectors of the economy, the software industry is a remarkable engine of economic growth around the world, and holds tremendous potential for the future. In particular, this industry will increasingly benefit the world’s economies, as they participate more fully and actively in the emerging “Information Society.”

In the foreseeable future, the packaged software industry is expected to further level the competitive playing field and improve the quality of life for all people around the globe. In order to fulfill its potential, however, the packaged software industry needs secure intellectual property rights, and accordingly, this study projects the additional benefits that the industry might generate if international protection of copyright were improved.

This report summarizes information and findings drawn from a series of reports on the software industry in various economies, shown in Figure 2.1. Individual reports are summarized later in this document, and readers should consult the individual study reports (available at www.bsa.org) for detailed discussions of the software industry in specific countries.
Figure 2.1  Economies Covered in this Report

**AFRICA/MIDDLE EAST**
- Egypt
- Gulf States
- Saudi Arabia
- South Africa
- Turkey

**AUSTRALIA AND NEW ZEALAND**

**CANADA**

**CHINA**

**EASTERN EUROPE**
- Bulgaria
- Czech Republic
- Hungary
- Poland
- Russia

**HONG KONG**

**JAPAN**

**KOREA**

**LATIN AMERICA**
- Argentina
- Brazil
- Chile

**SOUTHEAST ASIA**
- Indonesia
- Malaysia
- The Philippines
- Thailand
- Singapore
- Vietnam
- Taiwan

**UNITED STATES**

**WESTERN EUROPE**
- Austria
- Belgium and Luxembourg
- Denmark
- Finland
- France
- Germany
- Greece
- Ireland
- Italy
- Netherlands
- Norway
- Portugal
- Spain
- Sweden
- Switzerland
- United Kingdom
Packaged software is fundamental to the modern information society and plays an important role in each of the countries investigated. Computer hardware is manufactured, purchased, installed and maintained so that information can be gathered and used electronically. Software is the “central nervous system” that brings the hardware and the information together and allows the user to communicate with electronics. One of the technological and economic breakthroughs of recent years is the partial standardization of much of the world’s computer instructions in the form of “packaged” software. Packaged software is software that is developed for and used by multiple parties (as distinct from custom software, which runs on a single user’s information systems). Some of this software is used “as is,” while other forms of packaged software are purchased with considerable “value added” services, including training, maintenance, installation and customization. Appendix II provides more detailed information about the structure of the software market and industry overall.

Packaged software sales are growing in both absolute and relative terms. In 1996, global sales of packaged software reached over $118.4 billion, growing in 1997 to $135.4 billion. By the year 2001, sales of packaged software are expected to reach $231.8 billion. Sales of packaged software represented 17 percent of total information technology (IT) expenditures in 1996, and 18 percent in 1997; by the year 2001, sales of packaged software are projected to grow to 21 percent of total IT expenditures.a

The economies covered in this report and the companion volumes represent 99 percent of these sales in each referenced year. In 1996, the countries included in this report achieved packaged software sales of $117.2 billion of the worldwide total for that year, according to IDC. The figure for 1997 is $133.9 billion, and for 2001, is projected to be $228.8 billion, still 99 percent of total packaged software sales worldwide.a

In addition to the final sales of packaged software, this report also analyzes other economic activity associated with — and driven by — sales of packaged software. Important parts of this activity include the software distribution channels and software-related consulting services. The level of direct software sales activity within the distribution channel is included in the figures for total packaged software sales, as these numbers are quoted in terms of final (retail) end user purchases (packaged software publishers receive only a portion of these revenues.) Software-related consulting services are an important part of the additional revenues and expenditures generated worldwide by the IT services sector — collectively 37 percent of total IT expenditures in 1996 and 1997. Revenues worldwide for IT services were $248.4 billion in 1996, growing to $277.2 billion in 1997 and projected to increase to $390.6 billion in 2001, according to IDC. Our findings include estimates of expenditures, jobs and tax revenues for those segments of IT Services that are closely associated with packaged software. Figure II.1 in Appendix II shows the structure of the packaged software industry.

Beyond the distribution channel and related consulting services, the packaged software industry purchases business goods and services, and its employees purchase household goods and services. Moreover, both the industry and its employees pay taxes and other fiscal levies to government bodies. These purchases create further rounds of economic activity in so-called “upstream” and other segments of the economy, through multiple rounds...
of “indirect and induced” spending. Our findings include estimates of expenditures, jobs and tax revenues related
to this type of activity as well.

### 3.3 End User Employment and Export Sales

This study intends to measure all of the activities illustrated above except for the employment and expenditures
related to in-house installation and maintenance of packaged software systems. **We have not estimated the
number of people working in “end user” organizations in jobs directly related to the purchase and
maintenance of software.** For example, in-house departments may write software applications, customize or
install new software packages, train users, write systems specifications, and, in general, provide a steady
stream of services that were once purchased in the marketplace. Many of these jobs are partially dependent
upon the continued investment in and development of leading-edge software products created by packaged soft-
ware publishers. However, since in-house IT employment is technically confined to the end user community,
it is difficult to gather accurate statistics on such employment and, therefore, it has been excluded from this
study’s estimates.

Furthermore, with the exception of the report on the United States, the scope of this study excluded software em-
ployment and activity specifically tied to the **export** market (i.e., economic benefits not tied to domestic sales of
software). It is reasonable to expect that if the scope of this study had been expanded to include the effects of end user
employment and export sales, the estimates of the contribution of the packaged software industry to the global
economy contained herein would have increased considerably.
The rapidly developing market for packaged software and related services in the countries covered in this report brings numerous economic benefits including expanded economic opportunities and activity, extra jobs and increased tax revenue. In 1996/7 in the non-U.S. countries covered in this report, the packaged software industry:

- Registered $64.4 billion in final sales of software;
- Created a total of 741,258 jobs; and
- Generated $21 billion in government revenues of all types.\(^7\)

Based on Nathan Associates’ research, in 1997, the U.S. software industry:

- Created a total of 619,438 jobs in direct employment; and
- Contributed $7.2 billion in direct software industry tax revenues generated by federal and state corporate income taxes.

Throughout the world, in both economies enjoying high growth rates and those suffering setbacks, few industry sectors can expect to exceed the performance of the software industry. For the non-U.S. economies, final sales of packaged software in the non-U.S. countries covered in this report should reach $116.9 billion by 2000/01. This in turn will:

- Generate a total of 1,064,720 jobs; and
- Contribute $34 billion in tax revenues for the non-U.S. countries.

Based on Nathan Associates’ forecasts, the U.S. software industry has the potential to reach a size in 2005 that should:

- Create a total of 1,030,500 jobs in direct employment; and
- Contribute $25 billion in total tax revenues generated by federal and state corporate income taxes.

As impressive as these figures are, actual economic benefits could be considerably higher if progress is made in eradicating software piracy. This is the subject of the next chapter.

### 4.2 Industrial Competitiveness

The economic benefits of the packaged software industry go beyond the jobs or the tax revenues it generates. At a basic level, the use of IT automates many repetitive tasks that once required large investments of time, money and manpower. As a result, organizations of all types work more quickly and employ more highly skilled staff to concentrate on substantive rather than administrative work. Even in traditional cultural activities — such as writing a novel, composing music or designing plans for an opera house — software and computer technology save untold time and resources.
Developments in software and IT have improved the variety and sophistication of tasks that can be accomplished. The building designer can, for example, produce virtual-reality models to enable customers to “walk-through” and evaluate a building and countless possible variations long before ground is broken. “Groupware” and on-line networks allow interactive work among people all over the world. In every area of life, information technology is opening up new possibilities.

Packaged software’s relatively low cost and intuitive user-friendly interface bring the advantages of technology to every level of an organization. It frequently allows easier integration, maintenance and implementation, and can lower training costs.

On the broader level, information technology is increasingly credited with contributing to the unprecedented global prosperity of recent years (research in the U.S. shows that the wage rate of employees working with information systems [IS] is about three times as high as that of non-IS employees and their productivity is roughly six times as high.8) This view, which has been called the “New Paradigm,” finds that the increased use of IT and the expanding volume of international trade and investment have enabled the global economy to grow in non-inflationary ways. By supporting the restructuring of business processes and rapid expansion, information technology has created greater flexibility to meet the demands of a growing economy. It also has largely ended certain types of business cycles, such as inventory-related recessions. Specific examples of efficiency gains made possible by modern software and related information technologies abound:

For example, according to industry estimates:

- Installing graphical user interfaces (GUIs) on desktop PCs has been found to result in time savings through better usability, increased productivity, lower training and retraining costs, fewer support calls and a lower number of errors. Cost savings from error reductions alone can be as high as $480 per PC annually.

- Electronic mail (e-mail) messages can save 95 percent of the cost of a fax. Handling an electronic requisition costs one-tenth the amount required to handle its paper equivalent.

- Document image processing (DIP) can lead to productivity gains of 20 to 40 percent, and the payback period for imaging systems can be as fast as 12 to 18 months.

- Automation of various administrative functions related to sales and marketing can bring wide benefits such as minimizing wasted travel time; selecting good sales prospects; speeding up proposals, quotations and orders; improving the effectiveness of group meetings; and improving sales effectiveness overall.

- New communications services will enable small and medium-sized enterprises (SMEs) to realize savings of 4 percent of their turnover on average. IT experts also emphasize that the spread of new information technologies generates increased productivity, wealth creation and leads to a lower rate of inflation.

Consumers also benefit from packaged software, both from direct use — more and more homes are now equipped with PCs — and from the social benefits of the Information Society. Perhaps the most fundamental change under way in the desktop computer market, in some countries, is that consumers are catching up with businesses as the largest group of users. Sales of home computers for education and entertainment have soared. Consumer sales of packaged software products are likewise on the rise, as consumers require user-friendly operating systems and applications to write letters and reports, manage their home finances and communicate with friends through on-line services.
These IT gains are becoming more affordable by the day. Prices of PC business software applications have fallen sharply over the past five years. This development alone has made it even easier for the industry to improve its competitive advantage through the use of software. Stronger intellectual property protection and enforcement could increase the number of competing packaged software products while spreading fixed development costs over more units. These factors could promote market conditions that benefit consumers and businesses by further reducing software prices, which have historically fallen as technology and innovation have improved.
CHAPTER FIVE

THE IMPACT OF SOFTWARE PIRACY

5.1 Intellectual Property Rights are of Fundamental Importance

The packaged software industry is expected to continue to level the international playing field and improve the quality of life of all people around the globe. In order to fulfill its potential, however, the packaged software industry needs the same “social infrastructure” that is necessary for any part of the market economy to function effectively — strong copyrights, enforceable contracts and agreements, and free and secure movement of goods and services across borders. In particular, the digital nature of packaged software makes copyright protection exceedingly important to the growth and development of this industry. Accordingly, this study projects the additional benefits that the industry might generate if international protection of copyrights were to be improved.

As a creative industry, all aspects of the software industry are affected by public policies toward the protection and treatment of intellectual property. This is true for both advanced industrial nations and also for the world’s dynamic emerging economies.

Intellectual property rights take various forms. In the United States, for example, PricewaterhouseCoopers research has found that approximately 90 percent of software developers and publishers use some form of intellectual property protection, and virtually all larger software companies (companies with annual revenues of $50 million or more) do so. The most common forms of intellectual property protection in the United States are copyrights (83 percent of respondents in 1997) and trademarks (59 percent); software patents, a recent development, are now held by 41 percent of software companies with annual revenues of $10 million or more.

5.2 Software Piracy

Software piracy is the use or reproduction of a software product without the express consent of its author. When someone purchases a software product, the user is not only paying for a physical product; the user is also purchasing the right to use it. The right is granted to the user in the form of a license or contract, which outlines the nature of the product and its potential uses.

There are different kinds of piracy or software theft. The most common (and economically damaging, according to industry estimates) form of software piracy is “end user” piracy, where an individual or organization loads software onto computers in violation of the software license (for example, when a company is authorized to use software for one computer but loads it onto many others.) Loading unauthorized copies onto a hard disk at the time a PC is sold is another form of piracy, known as “hard disk loading.” This form of piracy is particularly acute in “client-server” installations. Similarly, individuals who download software from the Internet without authorization or payment are pirating software. Another type of software piracy is the counterfeiting of CD-ROMS, which has recently received an increasing amount of media attention, owing in part to the increased availability of CD-ROM manufacturing equipment.

Software piracy affects virtually all segments of the packaged software industry, though to a different extent, depending upon the type of product, the type of end user, and national characteristics. The BSA issues estimates, prepared by the economic firm International Planning and Research (IPR), of the software piracy rate for one class of software products, PC business software (see Appendix II for definitions). Estimated 1997 piracy rates for PC business software products range from a low of 27 percent in the United States to as high as 98 percent in Vietnam. The BSA estimates the market value of illegal copying of PC business software at $11.4 billion.
worldwide in 1997. As piracy also occurs in other market segments, the total market value of all pirated software is considerably higher.

A description of the legislative proposals and enforcement initiatives that have proven successful in certain countries is outside the scope of this report. However, as an example, the Italian government strengthened copyright laws and penalties in implementing the EC Software Directive in December 1992, and began aggressively enforcing those laws through the Italian fiscal and other national police. This produced a fourfold growth in the legal software market and reduced the estimated rate of illegal copying of PC business software in one year (1992-1993) from 85 percent to 50 percent. Effective national legislation and concerted government enforcement can produce a dramatic reduction in the incidence of illegal copying.

5.3 Software Piracy Impacts on Economic Benefits

Software piracy reduces the economic benefits created by the packaged software industry in important ways, even in economies where much of the packaged software is imported.

- First, piracy curtails the growth and development of the local software industry. It constrains the size of the distribution network and after-sales services and consulting that accompany legal software sales. Our study has documented the fact that software distribution and services are of growing importance to emerging economies worldwide.

- Second, high piracy rates inhibit the development of a domestic software industry that can create solutions to local software needs. Why go to the trouble of creating new products if, in your country, pirated copies will be widely available within weeks of the product launch? The countries with the most robust local software sector also have the lowest piracy rates.

- Third, a stunted domestic software industry keeps the local economies from fully benefiting from the Information Age by reducing the size of the local software industry and decreasing the active collaboration between software developers and end user organizations. Organizations of all sorts — not just high tech companies — need state-of-the-art information technology to stay competitive in today’s world.

- Fourth, a lax attitude toward intellectual property (creative works protected by copyright, such as software, books, movies and sound recordings) chills a country's status in the community of nations. It not only jeopardizes some types of international trade agreements, but also discourages all of the creative industries — ranging from entertainment to high technology — from making direct investments in the local economy.

Reducing piracy to the level of certain international benchmarks could produce as much as an additional 771,201 jobs and $22.9 billion in tax revenues for the non-U.S. countries covered in this report by 2000/01 in addition to the forecasted market growth. For the U.S. economy, reducing piracy could produce an additional 216,000 jobs and $1.6 billion in federal and state corporate income tax revenues by 2005.

More specifically, reducing 1996/7 levels of illegal copying in the overall packaged software market worldwide to benchmark levels would have increased total direct, indirect and induced employment by 521,663 jobs — from 741,258 jobs to 1,262,920 jobs for the non-U.S. economies. Such a reduction in illegal copying could produce an additional 771,201 jobs by the year 2000/01, over and above projected market growth, resulting in more than 1,835,921 jobs related to the packaged software industry by the year 2000/01 for the non-U.S. economies. For the U.S., reducing piracy to zero percent would have increased employment by 130,000 for 1996.
Reducing illegal copying of software would also increase the fiscal contributions produced by the packaged software industry. Governments would benefit from the higher direct and indirect taxation resulting from higher sales and profits. Personal taxation and social contribution receipts from the enlarged workforce would also rise. If piracy in the non-U.S. countries covered in this report had been reduced to benchmark rates in 1996/97, the estimated $21.0 billion in tax revenues generated by the packaged software industry in these countries could have been $34.6 billion. By the year 2000/01, an equivalent reduction in the piracy rate could increase tax revenues by $22.9 billion, from $34.0 billion to $56.9 billion for the non-U.S. economies. If piracy in the U.S. had been reduced to zero percent in 1996, the estimated federal and state corporate income tax revenues of $15.1 billion could have been approximately $16.1 billion. By the year 2005, an equivalent reduction in the piracy rate could have increased projected federal and state corporate income tax revenues by $1.6 billion, from $25 billion to $26.6 billion.

Sales and government revenues can enjoy substantial immediate increases when copyright laws are enforced against software piracy and when persons formerly using pirated software buy legal software. In the first year of the government anti-piracy campaign in Italy, for example, software publishers and distribution channels had difficulty satisfying the customer demands of so many new legal users. It is difficult to forecast the magnitude of this “catch-up” effect, and we have not included it in our projections. To illustrate its potential significance, however, if just 20 percent of the pre-existing illegal PC business software installations made during 1995 and 1996 for the non-U.S. economies were to have been legalized in 1997, the resulting additional sales could have reached $3.9 billion, and windfall government revenues, $1.3 billion for the non-U.S. countries.

### 5.4 Damage to Domestic IT Industry

As impressive as these numbers are, they do not tell the full story of the economic benefits of reduced piracy. A trend toward greater purchases through official channels encourages closer ties between the end user and the IT industry, leading to new and better products that create economic growth in the IT industry and improve the competitiveness of local businesses throughout the economy.

Over time, a significant reduction in the level of piracy will influence the behavior of the IT industry in economies worldwide and the way local industry uses IT to compete internationally. When asked how a change in piracy levels would affect software distribution channels, international IT experts predicted that such sales would grow in direct proportion to any piracy reduction. These respondents also reported that distributors and resellers adjust employment levels to the business opportunities facing them, and therefore, most would increase employment levels when they are convinced that positive market changes are not temporary.

Local software development firms have the capability of competing effectively with global brands in a number of application areas. IT professionals make a distinction between “vertical” or industry applications, such as those for manufacturing, banking and financial applications, and “horizontal” or cross-industry applications, such as word processing, payroll and accounting programs. Several popular types of PC software — word processors and spreadsheets — are associated with global publishers, but are a smaller part of the overall packaged software market than their familiarity might suggest. Moreover, some horizontal software applications — such as accounting and tax packages — are by their nature specific to a particular country and need annual updates. Similarly, many vertical software packages must be local or localized. This suggests that there is ample opportunity for local software developers in both horizontal and vertical market segments.

Although some software producers have the resources to supply many global markets, the majority of software development houses worldwide focus on their local markets. A recent PricewaterhouseCoopers survey shows that 65 percent of U.S. software developers provided only English-language products. Even among the largest U.S. soft-
ware companies, 24 percent provided only English-language versions. Therefore, the scope for local software development is significant. Particularly where the local language uses a unique character set, virtually all packaged software product categories were seen by our interviewees as highly contestable markets with no clear winner yet established.

The potential for local software development is made stronger by the nature of the business relationships. The typical local software publisher provides a variety of supporting services that must be delivered locally. In the U.S. in 1995, for example, the typical software publisher earned only 35 percent of revenues from the sale or licensing of software. The balance came from activities such as training, systems integration, resale, support and maintenance, and other consulting and professional services. Software developers, even small companies, frequently enter into marketing and business alliances with other local firms, including other software developers, consultants, equipment manufacturers, related product or service providers, systems integrators, publishing companies and key customers.

5.5 Damage to Investment in Software Development

Piracy and a lax attitude toward intellectual property protection have a chilling effect on software development. Local software publishers are unwilling to invest in research and development when there is a significant amount of software piracy. PricewaterhouseCoopers research shows that even in the U.S., where piracy rates are relatively low compared to those of other countries, and the domestic market very large, the majority of software companies are not profitable in their first year — and a significant number take four years or longer to achieve profitability. According to our research, most software developers with revenues of $10 million or less will choose not to fund a development project that will require significant revenues within two years.

The following table illustrates how piracy rates can discourage the decision to develop a new local software product. Two hypothetical cases are given, in which 20 different products are developed with a range of projections as to how quickly product sales are achieved. We assume that each product must achieve sales of $500,000 within two years to be approved for development and launch. Groups of five high sales potential software products, ten middle sales potential products, and five lower sales potential products are considered. In the first illustration, using the prevailing piracy rate in the U.S., 20 out of 20 are developed. Under the prevailing piracy rates typical in many emerging economies, only 5 out of 20 products will be developed. While these numbers are only illustrative, and do not incorporate all factors that software developers consider, they show that piracy can keep some software products off the market altogether.

Figure 5.1 Piracy Freezes Out the Development of New Local Products
5.6 Societal and Cultural Effects

A viable local IT sector is essential to keeping other sectors of the economy competitive internationally. In a world where many governments directly or indirectly fund policies to support local industries, the mere act of strengthening and enforcing copyright and other intellectual property laws is seen by some IT experts as the cheapest and most effective industrial policy that a government could pursue. Finally, intellectual property is as important to local culture and identity as it is to commercial objectives. Intellectual property rights are a useful tool in the preservation and enhancement of the unique culture and intellectual inheritance of every society.

For example, in response to our surveys of opinions as to how effective strengthened intellectual property protection might be in a number of policy areas, Latin American IT experts identified stronger copyright laws as improving a nation’s overall ability to compete internationally. They also thought it to be the most cost-effective industrial policy available to promote national interests. Finally, they believed that strengthening copyright laws helped promote and preserve unique cultural aspects and national identity. See Figure 5.2 below.

Figure 5.2  Respondents Believed Copyright Enforcement Brings Multiple Benefits

AFRICA / MIDDLE EAST

In 1997, according to IDC estimates, the packaged software industry in the nine countries we examined in Africa/Middle East reached $1.2 billion in final sales.

Based on IDC forecasts made at the end of 1997, the software industry has the potential to reach a size in 2001 that is equivalent to an average annual growth rate of 18.6 percent per annum for sales and half the market growth rate for employment, which means that by 2001, the industry should have final sales of $2.3 billion.

PricewaterhouseCoopers is currently completing a separate report on the employment and tax revenue benefits generated by the packaged software industry in Egypt, the Gulf States, Saudi Arabia, Turkey and South Africa. Breakout data for these markets will be provided in that report.
AUSTRALIA AND NEW ZEALAND

In 1996, according to IDC estimates, the packaged software industry in Australia and New Zealand reached $2.4 billion in final sales, which:

- Provided 30,467 direct and indirect jobs; and
- Generated $568.2 million in tax payments.

Based on IDC forecasts made at the end of 1997, the software industry has the potential to reach a size in 2001 that is equivalent to an average annual growth rate of 14.2 percent per annum for sales and half the market growth rate for employment, which means that by 2001, the industry should:

- Reach final sales of $4.6 billion;
- Create a total of 42,977 jobs in local software and supporting industries; and
- Generate $860.0 million in tax revenues from corporate earnings, consumption taxes on sales, taxation on industry suppliers and taxes on employee income and expenditures.

An impediment to this growth opportunity is software piracy, which stands at 32.6 percent in Australia and New Zealand for PC business software in 1996. This puts the market value of illegal copying of PC business software at $157.5 million, as estimated by IPR. If the level of piracy had been reduced to the benchmark level (27 percent for PC business software), such a reduction in illegal copying could have potentially:

- Increased employment by 6,688 jobs; and
- Contributed an additional $126.9 million in tax revenues for 1996.

The PricewaterhouseCoopers study concludes that if piracy is reduced to the benchmark level (27 percent), the Australian and New Zealand software industry will receive a boost and its contribution to the local economy will increase significantly.

At the projected growth rate of 14.2 percent and with a lowered piracy rate, the Australian and New Zealand economy has the potential to:

- Provide employment for an additional 9,342 people, bringing the total to 52,319 jobs in 2001; and
- Generate $191.3 million in additional tax revenues bringing the total to $1.1 billion in 2001.
In 1996, according to IDC estimates, the packaged software industry in Canada reached $3.0 billion in final sales, which:

- Provided 37,065 direct and indirect jobs; and
- Generated $803.0 million in tax payments.

Based on IDC forecasts made at the end of 1997, the software industry has the potential to reach a size in 2001 that is equivalent to an average annual growth rate of 13.4 percent per annum for sales and half the market growth rate for employment, which means that by 2001, the industry should have final sales of $5.7 billion and:

- Create a total of 51,264 jobs in local software and supporting industries; and
- Generate $1.3 billion in tax revenues from corporate earnings, consumption taxes on sales, taxation on industry suppliers and taxes on employee income and expenditures.

An impediment to this growth opportunity is software piracy, which stands at 42 percent in Canada for PC business software in 1996. This puts the market value of illegal copying of PC business software at $357.3 million, as estimated by IPR. If the level of piracy had been reduced to the benchmark (27 percent for PC business software), such a reduction in illegal copying could have potentially:

- Increased employment by 22,171 jobs; and
- Contributed an additional $480.3 million in tax revenues for 1996.

The PricewaterhouseCoopers study concludes that if piracy is reduced to the benchmark level (27 percent), the Canadian software industry will receive a boost and its contribution to the local economy will increase significantly.

At the projected growth rate of 13.4 percent and with a lowered piracy rate, the Canadian economy has the potential to:

- Provide employment for an additional 30,665 people, bringing the total to 81,929 jobs in 2001; and
- Generate $765.4 million in additional tax revenues bringing the total to $2.0 billion in 2001.
In 1997, according to estimates by CCID (a market research center in China affiliated with the Ministry of Electronics Industry), the packaged software industry in China reached $1.4 billion in final sales, which:

- Provided 37,245 direct and indirect jobs; and
- Generated $219.8 million in tax payments.

Based on adjusted CCID forecasts made in 1998, the software industry has the potential to reach a size in 2001 that is equivalent to an average annual growth rate of 28 percent per annum for sales and half the market growth rate for employment, which means that by 2001, the industry should have final sales of $3.6 billion and:

- Create a total of 62,904 jobs in local software and supporting industries; and
- Generate $590.1 million in tax revenues from corporate earnings, consumption taxes on sales, taxation on industry suppliers and taxes on employee income and expenditures.

An impediment to this growth opportunity is software piracy. The market value of illegal copying of PC business software in China is estimated at $1.4 billion, as estimated by IPR. If the level of piracy had been reduced to the benchmark level (27 percent for PC business software), such a reduction in illegal copying could have potentially:

- Increased employment by 90,875 jobs; and
- Contributed an additional $536.4 million in tax revenues for 1997.

The PricewaterhouseCoopers study concludes that if piracy is reduced to the benchmark level (27 percent), the Chinese software industry will receive a boost and its contribution to the local economy will increase significantly.

At the projected growth rate of 28 percent and with a lowered piracy rate, the Chinese economy has the potential to:

- Provide employment for an additional 153,486 people, bringing the total to 216,390 jobs in 2001; and
- Generate $1.4 billion in additional tax revenues bringing the total to $2.0 billion in 2001.
In 1997, according to IDC estimates, the packaged software industry in the five countries we examined in Eastern Europe reached $813.1 million in final sales, which:

- Provided 7,675 direct and indirect jobs; and
- Generated $183.4 million in tax payments.

Based on IDC forecasts made at the end of 1997, the software industry has the potential to reach a size in 2001 that is equivalent to an average annual growth rate of 7.4 percent per annum for sales and half the market growth rate for employment, which means that by 2001, the industry should have final sales of $1.1 billion and:

- Create a total of 8,923 jobs in local software and supporting industries; and
- Generate $251.1 million in tax revenues from corporate earnings, consumption taxes on sales, taxation on industry suppliers and taxes on employee income and expenditures.

An impediment to this growth opportunity is software piracy, which stands at 76 percent in Eastern Europe for PC business software in 1997. This puts the market value of illegal copying of PC business software at $450.1 million, as estimated by IPR. If the level of piracy had been reduced to the benchmark level (27 percent for PC business software), such a reduction in illegal copying could have potentially:

- Increased employment by 11,177 jobs; and
- Contributed an additional $245.4 million in tax revenues for 1997.

The PricewaterhouseCoopers study concludes that if piracy is reduced to the benchmark level (27 percent), the Eastern European software industry will receive a boost and its contribution to the local economy will increase significantly.

At the projected growth rate of 7.4 percent and with a lowered piracy rate, the five Eastern European economies covered in this report have the potential to:

- Provide employment for an additional 12,684 people, bringing the total to 21,607 jobs in 2001; and
- Generate $319 million in additional tax revenues bringing the total to $570.1 million in 2001.

The same IPR data regarding piracy places the market value of pirated PC business software in 1997 at $561.4 million for the entire Eastern European region, not just the five Eastern European countries covered in this report. Industry estimates based on these data indicate that, for the entire Eastern European region, reducing piracy to benchmark levels by the year 2001 could produce an additional 15,821 new jobs and $397.9 million in tax revenues over and above forecast market growth for a total of:

- 26,950 jobs; and
- $711.1 million in government revenues.
In 1996, according to IDC estimates, the packaged software industry in Hong Kong reached $279.0 million in final sales, which:

- Provided 4,199 direct and indirect jobs; and
- Generated $36.9 million in tax payments.

Based on IDC forecasts made at the end of 1997, the software industry has the potential to reach a size in 2001 that is equivalent to an average annual growth rate of 21.2 percent per annum for sales and half the market growth rate for employment, which means that by 2001, the industry should have final sales of $729.7 million and:

- Create a total of 6,949 jobs in local software and supporting industries; and
- Generate $96.6 million in tax revenues from corporate earnings, consumption taxes on sales, taxation on industry suppliers and taxes on employee income and expenditures.

An impediment to this growth opportunity is software piracy, which stands at 64 percent in Hong Kong for PC business software in 1996. This puts the market value of illegal copying of PC business software at $129.1 million, as estimated by IPR. If the level of piracy had been reduced to the benchmark level (27 percent for PC business software), such a reduction in illegal copying could have potentially:

- Increased employment by 5,778 jobs; and
- Contributed an additional $50.8 million in tax revenues for 1996.

The PricewaterhouseCoopers study concludes that if piracy is reduced to the benchmark level (27 percent), the Hong Kong software industry will receive a boost and its contribution to the local economy will increase significantly.

At the projected growth rate of 21.2 percent and with a lowered piracy rate, the Hong Kong economy has the potential to:

- Provide employment for an additional 9,563 people, bringing the total to 16,512 jobs in 2001; and
- Generate $132.9 million in additional tax revenues bringing the total to $229.5 million in 2001.
JAPAN

In 1996, according to IDC estimates, the packaged software industry in Japan reached $13.2 billion in final sales, which:

- Provided 139,313 direct and indirect jobs; and
- Generated $2.2 billion in tax payments.

Based on IDC forecasts made at the end of 1997, the software industry has the potential to reach a size in 2001 that is equivalent to an average annual growth rate of 12.2 percent per annum for sales and half the market growth rate for employment, which means that by 2001, the industry should have final sales of $23.4 billion and:

- Create a total of 187,315 jobs in local software and supporting industries; and
- Generate $3.4 billion in tax revenues from corporate earnings, consumption taxes on sales, taxation on industry suppliers and taxes on employee income and expenditures.

An impediment to this growth opportunity is software piracy, which stands at 41 percent in Japan for PC business software in 1996. This puts the market value of illegal copying of PC business software at $1.2 billion, as estimated by IPR. If the level of piracy had been reduced to zero percent, such a reduction in illegal copying could have potentially:

- Increased employment by 72,443 jobs; and
- Contributed an additional $1.1 billion in tax revenues for 1996.

The PricewaterhouseCoopers study concludes that if piracy is eliminated, the Japanese software industry will receive a boost and its contribution to the local economy will increase significantly.

At the projected growth rate of 12.2 percent and with eliminated piracy, the Japanese economy has the potential to:

- Provide employment for an additional 97,404 people, bringing the total to 284,719 jobs in 2001; and
- Generate $1.8 billion in additional tax revenues bringing the total to $5.2 billion in 2001.
In 1996, according to IDC estimates, the packaged software industry in Korea reached $843.0 million in final sales, which:

- Provided 10,743 direct and indirect jobs; and
- Generated $161.1 million in tax payments.

Based on IDC forecasts made at the end of 1997, the software industry has the potential to reach a size in 2001 that is equivalent to an average annual growth rate of 23.8 percent per annum for sales and half the market growth rate for employment, which means that by 2001, the industry should have final sales of $2.5 billion and:

- Create a total of 18,847 jobs in local software and supporting industries; and
- Generate $468.4 million in tax revenues from corporate earnings, consumption taxes on sales, taxation on industry suppliers and taxes on employee income and expenditures.

An impediment to this growth opportunity is software piracy, which stands at 70 percent in Korea for PC business software in 1996. This puts the market value of illegal copying of PC business software at $515.5 million, as estimated by IPR. If the level of piracy had been reduced to the benchmark level (27 percent for PC business software), such a reduction in illegal copying could have potentially:

- Increased employment by 16,144 jobs; and
- Contributed an additional $242.1 million in tax revenues for 1996.

The PricewaterhouseCoopers study concludes that if piracy is reduced to the benchmark level (27 percent), the Korean software industry will receive a boost and its contribution to the local economy will increase significantly.

At the projected growth rate of 23.8 percent and with a lowered piracy rate, the Korean economy has the potential to:

- Provide employment for an additional 28,327 people, bringing the total to 47,174 jobs in 2001; and
- Generate $704.0 million in additional tax revenues bringing the total to $1.2 billion in 2001.
In 1996, according to IDC estimates, the packaged software industry in the fifteen countries we examined in Latin America reached $2.8 billion in final sales, which:

- Provided 114,569 direct and indirect jobs; and
- Generated $1.2 billion in tax payments.

Based on IDC forecasts made at the end of 1997, the software industry has the potential to reach a size in 2000 that is equivalent to an average annual growth rate of 35 percent from 1997 to 1998 and 34 percent from 1999 to 2000 for sales and half the market growth rate for employment, which means that by 2000, the industry should have final sales of $9.4 billion and:

- Create a total of 218,853 jobs in local software and supporting industries; and
- Generate $3.9 billion in tax revenues from corporate earnings, consumption taxes on sales, taxation on industry suppliers and taxes on employee income and expenditures.

An impediment to this growth opportunity is software piracy, which stands at 68 percent in Latin America for PC business software in 1996. This puts the market value of illegal copying of PC business software at $910.8 million, as estimated by IPR. If the level of piracy had been reduced to the benchmark level (27 percent for PC business software), such a reduction in illegal copying could have potentially:

- Increased employment by 67,082; and
- Contributed an additional $679.7 million in tax revenues for 1996.

The PricewaterhouseCoopers study concludes that if piracy is reduced to the benchmark level (27 percent), the Latin American software industry will receive a boost and its contribution to the local economy will increase significantly.

At the projected growth rate (35 percent from 1997 to 1998 and 34 percent from 1999 to 2000) and with a lowered piracy rate, the Latin American economy has the potential to:

- Provide employment for an additional 127,936 people, bringing the total to 346,789 jobs in 2000; and
- Generate $2.3 billion in additional tax revenues bringing the total to $6.1 billion in 2000.

**SOUTHEAST ASIA**

![Diagram showing Latin America - Employment and Latin America - Government Revenues](image)
In 1996, according to IDC estimates, the packaged software industry in the six countries we examined in Southeast Asia reached $1.2 billion in final sales, which:

- Provided **14,597** direct and indirect jobs; and
- Generated **$280.8 million** in tax payments.

Based on IDC forecasts made at the end of 1997, the software industry has the potential to reach a size in 2001 that is equivalent to an average annual growth rate of 19.4 percent per annum for sales and half the market growth rate for employment, which means that by 2001, the industry should have final sales of **$3.0 billion** and:

- Create a total of **23,377** jobs in local software and supporting industries; and
- Generate **$686.9 million** in tax revenues from corporate earnings, consumption taxes on sales, taxation on industry suppliers and taxes on employee income and expenditures.

An impediment to this growth opportunity is software piracy, which stands at 84 percent in Southeast Asia for PC business software in 1996. This puts the market value of illegal copying of PC business software at $598.4 million, as estimated by IPR. If the level of piracy had been reduced to the benchmark level (27 percent for PC business software), such a reduction in illegal copying could have potentially:

- Increased employment by **14,201**; and
- Contributed an additional **$246.3 million** in tax revenues for 1996.

The PricewaterhouseCoopers study concludes that if piracy is reduced to the benchmark level (27 percent), the Southeast Asian software industry will receive a boost and its contribution to the local economy will increase significantly.

At the projected growth rate of 19.4 percent and with a lowered piracy rate, the Southeast Asian economy has the potential to:

- Provide employment for an additional **22,699** people, bringing the total to **46,076** jobs in 2001; and
- Generate **$595.6 million** in additional tax revenues bringing the total to **$1.3 billion** in 2001.
TAIWAN

In 1996, according to IDC estimates, the packaged software industry in Taiwan reached $292.0 million in final sales, which:

- Provided 4,860 direct and indirect jobs; and
- Generated $79.4 million in tax payments.

Based on IDC forecasts made at the end of 1997, the software industry has the potential to reach a size in 2001 that is equivalent to an average annual growth rate of 19.8 percent per annum for sales and half the market growth rate for employment, which means that by 2001, the industry should have final sales of $720.6 million and:

- Create a total of 7,791 jobs in local software and supporting industries; and
- Generate $196.0 million in tax revenues from corporate earnings, consumption taxes on sales, taxation on industry suppliers and taxes on employee income and expenditures.

An impediment to this growth opportunity is software piracy, which stands at 66 percent in Taiwan for PC business software in 1996. This puts the market value of illegal copying of PC business software at $117.0 million, as estimated by IPR. If the level of piracy had been reduced to the benchmark (27 percent for PC business software), such a reduction in illegal copying could have potentially:

- Increased employment by 6,982; and
- Contributed an additional $114.1 million in tax revenues in 1996.

The PricewaterhouseCoopers study concludes that if piracy is reduced to the benchmark level (27 percent), the Taiwanese software industry will receive a boost and its contribution to the local economy will increase significantly.

At the projected growth rate of 19.8 percent and with a lowered piracy rate, the Taiwanese economy has the potential to:

- Provide employment for an additional 11,194 people, bringing the total to 18,985 jobs in 2001; and
- Generate $281.6 million in additional tax revenues bringing the total to $477.6 million in 2001.
In 1996, according to Nathan Associates\(^7\) the broadly defined software industry in the United States reached $102.8\text{ billion}$ in total sales, accounting for both products and services. The industry:

- Employed 619,438 people directly; and
- Generated $7.2\text{ billion}$ in federal and state corporate and federal personal income tax revenues.

Industry sales of packaged and customized software were $56.9\text{ billion}$ in producers prices in 1996, according to Nathan Associates Inc. Separately, IDC has estimated retail sales of packaged software in the United States at $55.4 billion in 1996 and $63.3 billion in 1997.\(^8\)

From 1990 through 1996, software industry sales grew at an average annual rate of 12.5 percent, almost 2.5 times faster than the overall U.S. economy. The packaged business software segment of the industry grew even faster at 14.1 percent per year. Nathan Associates expects the broadly defined software industry to employ 1,030,500 people in 2005.

Like elsewhere, software piracy in the United States robs the industry of sales and threatens industry growth. IPR estimated a 27% U.S. piracy rate for PC business software in 1996, a rate equivalent to $6.5 billion in sales of producers in the broadly defined software industry in 1996. If piracy had been eliminated in the U.S. economy in 1996, the industry could have:

- Increased total direct and indirect employment by 130,000 people; and
- Contributed an additional $1\text{ billion}$ in federal and state corporate and federal personal income tax revenues in 1996 for the U.S. economy.

If piracy were eliminated by 2005, the packaged software industry has the potential to:

- Provide direct and indirect employment for an additional 216,000 people, bringing the total direct and indirect employment to 3,651,000 jobs; and
- Generate $1.6\text{ billion}$ in additional federal and state corporate and federal personal income tax revenues, bringing the total tax revenues to $26.6\text{ billion}$ for the U.S. economy in 2005.
In 1996, according to IDC estimates, the packaged software industry in Western Europe reached $37.0 billion in final sales, which:

- Provided 334,181 direct and indirect jobs; and
- Generated $15.0 billion in tax payments.

Based on IDC forecasts made at the end of 1997, the software industry has the potential to reach a size in 2000 that is equivalent to an average annual growth rate of 10 percent per annum for sales and half the market growth rate for employment, which means that by 2001, the industry should have final sales of $59.7 billion and:

- Create a total of 426,464 jobs in local software and supporting industries; and
- Generate $21.8 billion in tax revenues from corporate earnings, consumption taxes on sales, taxation on industry suppliers and taxes on employee income and expenditures.

An impediment to this growth opportunity is software piracy, which stands at 43 percent in Western Europe for PC business software in 1996. This puts the market value of illegal copying of PC business software at $2.6 billion, as estimated by IPR. If the level of piracy had been reduced to the benchmark level (27 percent for PC business software), such a reduction in illegal copying could have potentially:

- Increased employment by 201,645 jobs; and
- Contributed an additional $9.5 billion in tax revenues for 1996.

The PricewaterhouseCoopers study concludes that if piracy is reduced to the benchmark level (27 percent) in the United States, the Western European software industry will receive a boost and its contribution to the local economy will increase significantly.

At the projected growth rate of 10 percent and with a lowered piracy rate, the Western European economy has the potential to:

- Provide employment for an additional 258,651 people, bringing the total to 685,115 jobs in 2001; and
- Generate $13.9 billion in additional tax revenues bringing the total to $35.6 billion in 2001.
PricewaterhouseCoopers LLP was engaged to evaluate the contribution of the packaged software industry in 61 countries worldwide, except for the U.S. study which was undertaken by Nathan Associates Inc. In performing this investigation, PricewaterhouseCoopers contacted over 300 local operations of software publishers and developers, software distributors and resellers, software consultants and other IT professionals, and performed other investigations of the structure and economic linkages of the software industry. To avoid duplication of effort, PricewaterhouseCoopers has relied upon research by other parties for some of the information used in our calculations.

- PricewaterhouseCoopers has not undertaken full investigations and cannot verify the data provided by a number of software and market research companies in making our estimates as to the level of software sales and related activity in the region.

- We have relied upon field research conducted by other parties and sponsored by the BSA for estimates of prevailing piracy rates in the PC business software market, and on published national economic statistics in developing some of our estimates of downstream, indirect and induced economic activity linked to software sales. In as much as economic and market statistics vary widely from country to country, the findings in this report rest upon certain assumptions and estimates that cannot be fully verified.

- In conducting our analysis of the contributions of the packaged software industry, PricewaterhouseCoopers undertook a survey of a number of software publishers and other IT professionals worldwide. The results of this effort are discussed later in the Appendix.

Scope of Work
1. The economic model used to analyze the effect of packaged software on the global economy incorporates data from a number of sources. Key inputs are:

- Software publishers’ data — A number of software companies provided country-level data on their sales, sales by channel, tax payments and direct employment. Aggregate data on packaged software sales throughout each country were also obtained. Where available, macroeconomic data on output, employment, population, income, industry purchases, R&D, taxation and salaries were used to corroborate assumptions and general economic data.

- Published reports and electronic databases — Market information from IDC, a computer industry data research group, was one of the sources used to estimate the total size of the packaged software market for all of the non-U.S. countries in this report except for China. The Chinese market data was provided by CCID-MIC, a market research center in China affiliated with the Ministry of Electronics Industry. Data on the global sales and employment of U.S. software publishers was also taken from Compustat databases and from other information sources such as publicly filed annual reports of companies.

- PricewaterhouseCoopers information — Through its work in the industry, PricewaterhouseCoopers has gathered information and data from numerous sources in the public domain and from industry contacts. PricewaterhouseCoopers tax experts also participated in developing the tax rate assumptions used in this study. PricewaterhouseCoopers undertakes annual reviews of the information technology industry, and this
study considered information contained in these other PricewaterhouseCoopers publications, including our annual Technology Forecast and our annual Software Business Practices Surveys.

- Economic data — This study also relies upon various government and multilateral institution statistics on GDP, imports, employment and earnings. Where available, macroeconomic data on output, employment, population, income, industry purchases, R&D, taxation and salaries was used to corroborate assumptions and general economic data.

An overview of the economic model used in this study is provided as Figure I.1 below.

![Figure I.1 Overview of the Economic Investigation](image)

The methodologies, assumptions and data sources used are explained further in the appendix. In general, data from IDC was used to obtain independent estimates of software market size and market shares for each country. Using known relationships between sales, employment and tax rates, these estimates were then used to estimate the aggregate sales, direct employment and fiscal contributions of all packaged software publishers in the country. Similarly, upstream and downstream industries’ contributions were estimated based on patterns of purchases and sales, to develop a model of the economic structure of the software supply chain.

These relationships were then used to develop estimates for the entire market. Actual tabulated responses together with conservative assumptions on gross and net margins, average earnings, and expenditures by category were then used to estimate upstream and downstream employment and fiscal contributions. All assumptions and estimates were cross-checked where possible, using available published reports and economic data and the results of our worldwide market research of the software industry. The assumptions and methodologies differ between the various reports based on available data and information sources. For further details of the assumptions and methodologies, the reader will need to review the appendices of the individual reports.

**Currencies**
3. All figures and amounts are stated in current U.S. Dollars.
Market Sizes and Shares
4. Estimates of the total market size of software are based on information found in market reports by IDC, as well as proprietary data provided by a number of major software companies. The market for all packaged software includes a wide variety of software packages that were all developed for and sold to multiple customers. This software includes products for mainframes, mid-range platforms and PCs. Mass distributed products include home, educational and business software. Also included are large and very expensive mainframe packages such as operating systems. Rapidly growing client-server and other enterprise-wide systems and large database management programs are included as well. Estimates of final demand (retail sales levels) were obtained from IDC for each market. Software publisher revenues were then estimated using estimates of average effective channel uplift factors.

5. Market growth rates from 1996/97 to 2000/01 for packaged software were based on IDC forecasts and, in the case of China, developed from information provided by survey respondents and CCID-MIC. In cases where economic problems developed during the course of the investigation, such as in Russia and some Asian countries, the IDC forecast growth rate was reduced to lower levels based on the information available to us. Software projections in the latter years can be problematical, owing to the fast pace of technological change in this industry. Accordingly, the projected market growth rates are provided for illustrative purposes, and should not be taken as an official forecast of the software market by PricewaterhouseCoopers, the BSA or any of its members.

Direct Employment
6. Estimates of employment by software publishers were made using the results of the PricewaterhouseCoopers survey, proprietary records of some software publishers and public information disclosed by U.S. software publishers, as captured on Compustat records. Employment estimates were based on known employment levels for a sub-sample of the PC business software market, together with statistical relationships between sales and employment, globally and within the region. Estimates also reflect the employment-to-sales ratios for the share of market held by domestic software publishers in the region. However, the estimate specifically excludes employment associated with custom software development and any employment geared specifically to export markets. The former is believed to be quite significant in some countries; the latter category is of less importance. Estimation of employment in software publishing is somewhat imprecise, owing in part to the number of organizations that produce packaged software as part of the other business activities, ranging from custom software development to management consulting services.

7. Employment created in downstream activities (forward linkages) arises from the distribution, further development, installation, training, support and maintenance, etc., of packaged software. Estimates of downstream direct employment, by the distribution channel and related service providers, were made based on information concerning channel characteristics as to operating margin, payroll, salary, and employment, drawn from our interviews with software publishers and/or their distribution channels in each region. As channel margins vary significantly from product to product, we developed parameter estimates based on conservative estimates. Based on these procedures, PricewaterhouseCoopers arrived at estimates of the total expenditures on payroll and the size of employment by sector. Total market size for consulting and related services was estimated based on market data from IDC.

Upstream Indirect and Induced Employment
8. Upstream activities are of two broad types. Indirect activity comprises businesses that provide goods and services purchased by software publishers and downstream sectors. Induced activity comprises businesses that sell additional goods and services to households, as a result of the increased economic activity, employment and incomes. We derived these estimates from relationships we identified between sales, purchases, payroll and employment.
9. Indirect employment was estimated by analyzing our survey results and other information on overall macro-economic relationships. Using the same procedures as were used in analyzing downstream employment, we derived operating margin, payroll, and employment relationships and applied them to the estimated sizes of immediate purchases by the software industry (publishers and downstream). As a conservative means of accounting for multiple rounds of indirect effects, such as further purchases of goods and services from one business service provider to another, we used a terminal value calculation. Full-time equivalent (FTE) employment numbers were then derived from the observed relationships between output, payroll and employment.

10. Induced employment was estimated in a similar manner. Induced employment refers to the additional jobs created by “final demand.” For some emerging economies, the final demand estimates include government expenditures from taxes collected plus the consumer purchases of public sector employees and their families.

Government Revenues
11. The tax contribution to the governments of the packaged software industry was estimated by adding corporate taxes, VAT and other tax receipts from the sale of packaged software, personal income taxes and contributions to social security generated by the direct and indirect employment.

12. We included all personal income and consumption tax receipts, i.e., those attributable to direct, indirect and induced employment for personal income taxes and contributions to social security, in the figure for induced effects. The contributions made by increases in personal income are recorded as an “induced” effect, so including all personal taxes paid in this category is consistent with the meaning of the term.

13. The average effective tax rates in 1996/97 were derived from information compiled by the international tax practice of PricewaterhouseCoopers and proprietary records of a number of BSA members. These tax rates were applied to the levels of sales, payroll, value-added and operating margin.

In keeping with our effort to ensure that all calculations are conservative, where information was unavailable, unreliable or difficult to apply meaningfully to aggregate income or sales data, we set the applicable tax rate to zero, effectively eliminating that fiscal levy as a source of government revenue contributions.

Piracy Impacts and Rates
14. Software piracy hampers the development of the local industry and causes a number of harmful effects. To the extent that lower piracy rates would increase purchases of software through legal channels, lower piracy levels would create more economic activity, more jobs and more government revenues in the software supply chain. It would also create more activity, jobs and tax revenues among businesses that offer goods and services to the software suppliers and to employees’ families.

To quantify this effect, PricewaterhouseCoopers built economic models that demonstrate the amount of economic activity generated by this industry at different levels of final demand for software. We then estimated the size of the total economic benefit, at different levels of final demand corresponding to different prevailing piracy levels. To simulate the effect of a lower prevailing piracy rate on the level of economic benefit generated by this industry, we estimated the size of final demand (sales to end users), all else being equal, given a lower prevailing piracy rate. We then computed the resulting economic benefit, using the same economic model used to establish the base case.
The new market size associated with reduced piracy was estimated by applying an econometric model that estimates how the total software market grows as the piracy rate declines. We ascertained this by using cross-sectional data for nearly 50 countries and looking at the relative shift in market share between software products that are more or less susceptible to piracy. On this basis, we developed statistical models in which the effect of a decline in piracy of packaged PC business software is associated with a corresponding increase in the size of the market for all packaged software, all else being equal. In other words, a given reduction in the overall piracy level (indexed according to the piracy rate specific to PC desktop software for which estimates are available) is associated with different growth rates in various other market segments. As a result, the overall market would expand. A decline in piracy rates consistent with a reduction in the prevailing rate for PC business software to the benchmark level led our model to forecast proportionately larger increases in market size, in most countries. This is possible because the illegal market is often larger than the legal market, and small changes in the former correspond to larger changes in the latter. Licensing under-reporting, counterfeiting, and other violations of intellectual property are endemic in a number of markets.

We assumed that this was the prevailing piracy rate at the beginning of the year and that no time lag or pricing or structural change would be necessary to reach new equilibrium conditions. The views of our survey respondents suggest that they would experience revenue benefits from such a reduction in employment immediately, and that it would not have any lagged or nonlinear effect on their business operations. Changing levels of profit and operational activity would be immediate and proportionate.

We made no estimate of the effects of a reduction in piracy to a zero level, but rather used a reduction in piracy rates to the level estimated by IPR for the United States in 1996/7 for all non-U.S. economies except for Japan. In particular, we assumed that the estimated piracy rate for PC business products would fall to the U.S. reference case level, which is 27 percent. We further assumed that all other software product categories would experience a decline to the U.S. level.

In the case of Japan, the reference case for piracy reduction was a zero piracy rate. A different methodology was used in the U.S. report (see item 16 below). The U.S. report also used a zero piracy scenario.

As piracy is an illegal activity, it is impossible to put a precise figure on the extent of piracy or the exact amount of harm that it causes. Any calculation based on a reduction of piracy, naturally, is somewhat speculative. Statistical methods used in our analysis are expected to yield unbiased estimates “on average”, but cannot explain or predict all individual market idiosyncrasies. Our discussions with IT professionals suggest that our projections are a reasonable approximation of the benefits that would accrue if piracy rates could be reduced to benchmark levels. For some software product categories, including PC business software, where software piracy rates are high, the benefits, proportionately, might actually be higher than the overall average, and for other product categories, lower.

There are historical precedents for piracy rates falling in a short period of time by fairly dramatic levels, though no other country has yet reached the U.S. level. The U.S. piracy rate scenario is a global benchmark, since it reflects the experience of the country that has led to the development of this industry. Piracy rates worldwide may continue to fall, making the current U.S. rate of 27 percent attainable in other countries within a few years — possibly within the time horizon considered in this report.

Overall, with the exceptions noted above, we have estimated the impact of a reduction in piracy to the levels experienced in the United States. We arrived at these rates by using IPR average rates for the PC business software sector, plus an analysis of how the share of products that are more and less likely to be pirated shift depending upon the prevalence of piracy in the market. We then built a reference scenario in which the piracy rate for PC business software declined to 27 percent.
Comparisons Among Reports in this Series

15. This global summary incorporates the findings of certain regional studies recently released by the BSA. The BSA commissioned PricewaterhouseCoopers to conduct studies into the contribution of the packaged software industry to various regions throughout the world. Those studies resulted in reports for Africa/Middle East, Australia-New Zealand, Canada, Eastern Europe, Western Europe, Hong Kong, Japan, Korea, Latin America, Taiwan, and Southeast Asia countries and regions. These reports were issued by PricewaterhouseCoopers between July 1997 and November 1998, except for the report on Africa/Middle East, which is expected to be released in the Spring of 1999. Separately, the BSA commissioned Nathan Associates Inc. to conduct a study on the United States software industry, the findings of which were published in a June 1997 report, to be updated in 1999.

16. PricewaterhouseCoopers was not engaged to and did not independently assess the contribution of the packaged software industry to the U.S. economy. Therefore, all findings with respect to the U.S. market reported herein are those of Nathan Associates Inc. Furthermore, the U.S. study involved different methodologies than those employed in the other economies of the world and defined the market differently. The U.S. study included consideration of receipts from international sources, while the other studies were restricted to the relevant domestic market. Other salient differences between the U.S. study and other studies include the methodologies used to forecast employment growth, sales growth under reduced piracy assumptions, and tax and multiplier effects. Such differences affect the comparability of the U.S. study findings to the findings reported herein for other regions of the world. Accordingly, the reader of this global summary report is encouraged to refer to the individual regional study reports to understand any differences in methodologies and data sources underlying amounts reported herein.

17. While generally similar analyses and procedures were used in all reports issued by PricewaterhouseCoopers, the methodology was adapted in each instance to the specific market conditions and data availability prevailing in the market under investigation. Differences in our findings from one report to another reflect both sources of variability — actual economic conditions and adaptations to methodology dictated by the strengths and weaknesses of available information.

Cautionary Note

18. All assumptions and estimates were cross-checked where possible, using available published reports and economic data and the proprietary market research of selected software publishers. Economic data gathering in some countries is difficult and possibly unreliable. In any investigation of this nature, some error is bound to be inherent in the study estimates. Users of this report are advised to use the information with caution.

19. In preparing the information for this report including graphs, it was necessary to make certain assumptions concerning growth in several key economic variables, such as sales, industry employment and tax revenues. Such assumptions are subject to all the limitations inherent in projecting future results. In making these assumptions, we employed procedures that we believed to be reasonable in the circumstances.

Nevertheless, the reader needs to appreciate the possibility that future economic results may be different in a significant degree from the projections contained in this document. Furthermore, the reader should understand that the projections were prepared for the purposes indicated elsewhere in this document and should not be used in connection with decisions concerning the purchase or sale of securities.
The Packaged Software Industry
This report covers a diverse market of packaged software designed to operate on a specific range of computer “platforms.” Brief definitions of the areas covered by this report are as follows:

■ Business software — the operating system that controls the computer and applications programs, as well as the applications programs themselves (such as word processors, spreadsheets, graphics, communications, database management, CAD and networking products), but excluding entertainment and educational programs. Business software includes both “packaged” and “custom” software, as defined below.

■ Packaged, noncustom-developed software (“packaged software”) — software that is not written to individual customers’ specifications (“custom software”), but for distribution through a variety of channels. Custom software, not covered in this report, consists of computer programs of all types that are written for a particular end user or installation alone. Some custom software becomes “packaged” software eventually, if it proves successful and has market potential, but ordinarily there will be some further development before commercialization is attempted.

■ PC business software — an important segment of the overall packaged software market. For all hardware platforms, PC business products fall into a number of common product categories. These consist of operating systems, desktop products (word processing, spreadsheets, database management, graphics and the like), computer-aided engineering products (CAE and CAD), accounting, communications, utility and other business software products of various types. The boundary of PC business software is not always clear-cut, but typically (as in this study) excludes games, educational, entertainment and other leisure programs used in the home.

■ Platforms — primarily the personal computers (PCs) and mid-range computers, including “servers,” on which packaged software is designed to run. So-called “mainframe” computers are also included, to the small extent that packaged software has been installed on them. Computers are commonly referred to as “hardware” and a particular type of computer system as a “hardware platform.”

Packaged software publishers contribute directly to the economy through head offices or local subsidiaries. The software publishers’ direct economic contribution to the economy is augmented by both upstream and downstream industries that derive business through the software publishers.
Hardware Platforms
The “hardware platforms” or computer systems that use packaged software comprise PCs, mid-range and mainframe computers. Distinctions among these platforms are blurring rapidly, however, as PCs and mid-range computers continue to become more powerful, and as intranets and client-server and enterprise-wide systems come into more common usage. Industry experts foresee continued growth in this market:

- Software for PCs is usually packaged and is typically distributed by the author/publisher through third parties, as described in more detail below.

- Software for UNIX-based and other mid-range computer platforms comprises both packaged and customized products.

- Software for large mainframe computers is complex, most of it highly tailored to the users’ specific needs. As a result, unit sales are low, but fetch a high value. Hardware vendors themselves usually distribute such software directly.

In this report, we analyze the total market for all packaged software which includes the market segment of PC business software of the sort published by BSA members. The segmentation of all software running on all hardware platforms is shown in Figure II.2.
Distribution Channels
Distribution channels for packaged software products are both complex and changing (Figure II.3). The principal routes to market used by software publishers include:

- Direct Distribution — Publishers license or sell their products directly to end users, whether under individually negotiated or “shrink-wrap” license agreements, by mail order, or electronically via the Internet. Direct licenses have become widely used with major corporations, governments and educational institutions. The trading arrangements between some international software publishers and local customers sometimes mean that even “direct” distribution involves an importer’s services.

- Original Equipment Manufacturers (OEMs) — Publishers license these computer hardware manufacturers to reproduce or otherwise “bundle” the software with the hardware sold by the OEM. For purposes of this study, “OEM” refers only to those companies that distribute other companies’ software; OEMs that publish and market their own software are included in the software publisher category.

- Distributors — Publishers license these third-party warehousers to purchase, stock and resell software packages to retail dealers or end users, typically subject to an end-user license. Some distributors (sometimes called “resellers”) also operate their own retail sales channel, or act as value added resellers (VARs), as described below.

- VARs — These specialist resellers, who purchase software packages either from the publisher directly or from distributors, provide end users with a wide range of services with the software they resell, such as integrating the software with hardware or other products, providing training or maintenance, developing custom applications and the like.

- Software Service Providers — Like VARs, software service providers are principally involved in delivering complex consulting, development, maintenance or other services related to software. These consultants are distinguished from VARs primarily by the lack of a direct link to the software sale, or by the sale of software representing a very small proportion of the total service.
This varied and highly competitive pattern of distribution channels is complicated even further by end user preferences in different countries and rapid technical and market changes. For example, electronic delivery of software is becoming popular in some countries, and will likely be more common in the coming Information Society. Large end user organizations are reportedly preferring closer ties with software publishers and VARs as opposed to traditional dealers.

**Multipliers**

The term “multiplier effect” is sometimes used as a way of understanding and quantifying the effect of increased economic activity throughout the economy. Multipliers can refer to dollar values or employment. The multiplier measures the ratio of direct economic activity/employment generated by a new investment, activity, or change in public policy or economic conditions, to the total direct plus indirect plus induced effects. (Some studies also report multipliers that are the ratio of direct to indirect plus induced; it is therefore important to understand how a given study defines its metrics.)

In this study, the direct effect consists of the sales of software publishers and downstream distribution; the indirect effect, the purchases of goods and services by the increased industrial activity or direct effect; and the induced effect, the personal income (earnings) spent by workers. (Our estimates of total economic activity and employment effects follow from an analysis of the linkages among economic sectors — what is sometimes termed the “direct requirements” approach. This method relies on examining the actual pattern of purchases and sales by firms directly linked to the economic activity.)

Multiplier effects occur in “rounds” of spending, which occur over a period of time. A reseller receiving $1,000 for software may spend $800 on restocking the product, $100 on salaries and commissions and $50 on professional services. The $100 spent on payroll will be re-spent by the employee on other goods and services, and the $50 spent on professional services will also be partly re-spent on payroll for other business services, and so on. These multiple rounds can be cumulated mathematically for as many rounds as desired. (In our calculations, we took a conservative approach of truncating all spending after the second multiplier round, and substituting 10 percent of the second round effect as an alternative to aggregating all further rounds. First and second round effects were estimated from our survey data, showing relationships between sales and purchases.)
About the BSA

Since 1988, the Business Software Alliance (BSA) has been the voice of the world’s leading software developers before governments and with consumers in the international marketplace. Its members represent the fastest growing industry in the world. BSA educates computer users on software copyrights; advocates public policy that fosters innovation and expands trade opportunities; and fights software piracy. BSA worldwide members include Adobe Systems Incorporated, Attachmate Corporation, Autodesk, Inc., Bentley Systems, Inc., Corel Corporation, Lotus Development Corp., Microsoft Corporation, Network Associates, Inc., Novell, Inc., Symantec Corporation, and Visio Corporation. Additional members of BSA’s Policy Council include Apple Computer, Inc., Compaq Computer Corporation, IBM Corporation, Intel Corporation, Intuit Inc. and Sybase, Inc.

NOTES

1 “Packaged” software consists of all software written for multiple customers and for all types of computer platforms. It is software that is not written to individual customer specifications ("custom software"), but for distribution through a variety of channels. All figures in this report are quoted in current U.S. dollars.

2 Argentina, Australia, Austria, Bahrain, Belgium, Brazil, Bulgaria, Canada, Chile, China, Colombia, Costa Rica, Czech Republic, Denmark, Ecuador, Egypt, Finland, France, Germany, Greece, Guatemala, Hong Kong, Hungary, Indonesia, Ireland, Italy, Jamaica, Japan, Korea, Kuwait, Luxembourg, Malaysia, Mexico, Netherlands, New Zealand, Norway, Oman, Panama, Peru, Poland, Portugal, Puerto Rico, Qatar, Russia, Saudi Arabia, Singapore, South Africa, Spain, Sweden, Switzerland, Taiwan, Thailand, The Philippines, Trinidad and Tobago, Turkey, United Arab Emirates, United Kingdom, United States, Uruguay, Venezuela and Vietnam.

3 Throughout Chapters 2-5, retail sales figures are the latest available from IDC. Figures for employment and fiscal contributions are findings from individual PricewaterhouseCoopers LLP studies, which include the use of different base years and different forecast years and, in certain cases, differing forecasting methodologies. For illustrative purposes, this report includes certain amounts representing the aggregate of PricewaterhouseCoopers individual study findings. The reader should consult individual country and region sections for the years used in various reports, the estimated size of market sales, and the assumptions and methodologies employed to project future and potential contributions to the economies. The estimate of market size used in the individual reports in this series may be different than the latest revised estimates available from IDC. In the case of China, the market size estimate was provided by the Chinese institute responsible for gathering official IT statistics. Unless otherwise stated, the amounts and statistics presented in this report are related to the countries referenced in Figure 2.5 of this report.

4 Unless otherwise stated herein, the data for the United States was based upon a research report by Nathanson Associates Inc. The period encompassed in the U.S. report was 1996 through 2005. The projected years of 2000/1 and 2005 were reported in the PricewaterhouseCoopers and Nathanson Associates studies, respectively.

5 Benchmark levels vary from country to country and from one software category to another. For U.S. business software, benchmark levels of 27 percent (the rate currently experienced in the U.S.) were used for most countries, and a rate of zero percent was used for the United States and Japan.

6 All sales data, as distinct from other economic findings, and including future projections, are taken from reports issued by the IDC market research company, unless otherwise indicated. IDC issues periodic revisions to their past and projected sales levels, and the reader may wish to review the most recent IDC data available.

7 For convenience and consistency, discussions employ the latest retail sales estimates issued by IDC so that a summation of earlier sales estimates taken from individual reports (summarized later in this report) will not agree with IDC’s most recent estimates.

8 We arrive at these figures for jobs and tax revenues by summing the findings in individual studies. The composite figure for retail sales uses the latest IDC estimates for base (1996 and 1997) and forecast year sales used in the individual reports for the non-U.S. economies. We relied upon the study conducted by Nathanson Associates for the U.S. figures.


10 For the U.S. and Japan, our studies used a zero percent rate of piracy as the benchmark. For other countries, the benchmark was the 1996/7 U.S. piracy rate. This rate varies from one product-market segment to another. For PC business software, the U.S. 1996/7 piracy rate was 27 percent; according to estimates made by International Planning and Research (IPR) and commissioned by the Business Software Alliance and the Software and Information Industries Association.

11 For further discussion of the impact of piracy, see Appendix I.

12 The countries referred to in this report: Egypt, the Gulf States, Saudi Arabia, South Africa and Turkey.

13 This estimate has not been independently verified by PricewaterhouseCoopers.

14 The countries referred to in this report are: Bulgaria, Czech Republic, Hungary, Poland and Russia.

15 This estimate has not been independently verified by PricewaterhouseCoopers.

16 The countries referred to in this report are: Argentina, Brazil, Chile, Colombia, Costa Rica, Ecuador, Guatemala, Jamaica, Mexico, Panama, Peru, Puerto Rico, Trinidad and Tobago, Uruguay and Venezuela.

17 The countries referred to in this report are: Indonesia, Malaysia, The Philippines, Singapore, Thailand and Vietnam.

18 For the United States is based upon a research report issued by Nathanson Associates Inc., which is not affiliated with PricewaterhouseCoopers. There are a number of differences between the market and industry definitions and study methodology that should be considered when making any direct comparison between the findings for the U.S. and those for other economies summarized in this report. Appendix I discusses key differences. PricewaterhouseCoopers takes no responsibility for Nathanson Associates’ estimates for the U.S. economy. We have included employment and revenue effects from this study in our summary statements in Chapters 3-5.

19 These receipts are all revenues received directly by the U.S. operations of software firms (wholesale prices) from both domestic and international sources. These receipts exclude some software sales for U.S. companies supplying international markets from their foreign subsidiaries. A number of software companies source software from their U.S. operations and net from their foreign offices. U.S. retail sales are all end-user purchases (retail prices) made in the American market, including those made for software developed by non-U.S. firms.

20 The countries referred to in this report are: Austria, Belgium and Luxembourg, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.