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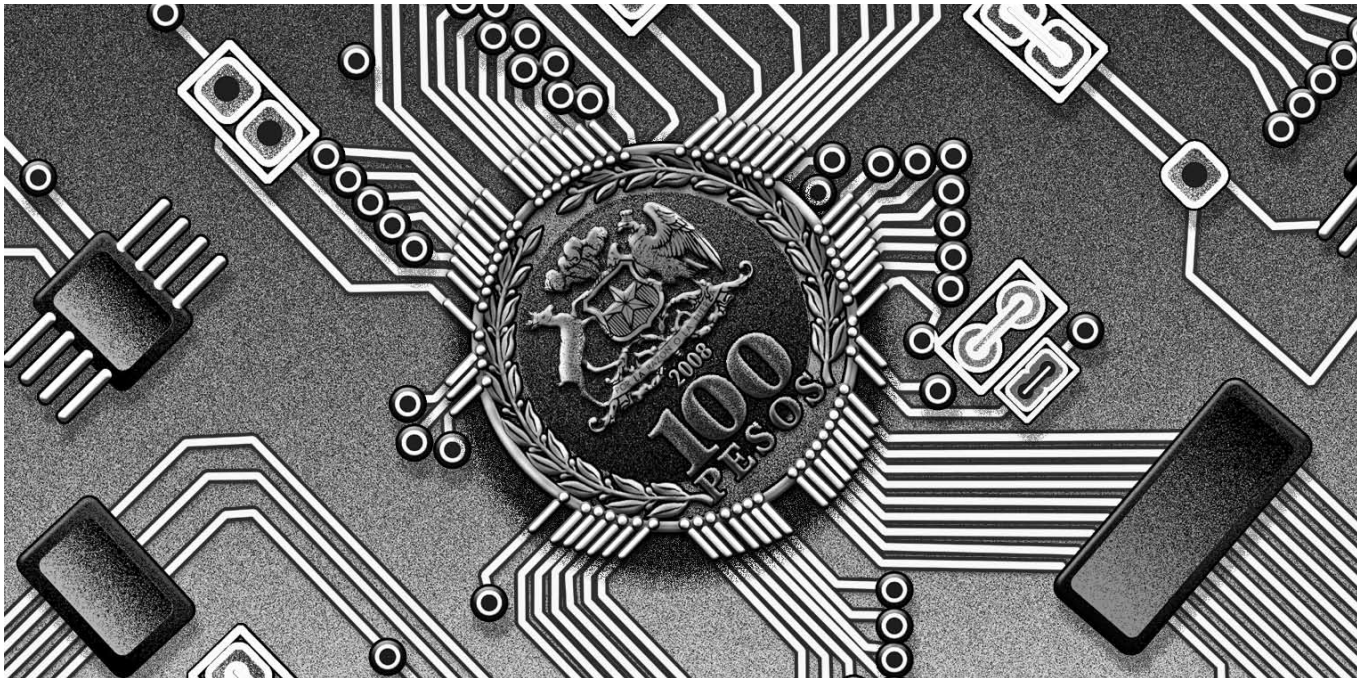

Size and Structure of the Chilean Information Econo

Tamaño y estrutura de la economía de la información chilena

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Resumen

Este artículo presenta los resultados de una investigación orientada a medir el tamaño y la estructura de la economía de la información en Chile, así como el crecimiento experimentado por este sector entre los años 1996 y 2003. Basándose en el marco analítico desarrollado por Porat y Rubin, este estudio también compara a Chile con Corea y Estados Unidos. Los hallazgos muestran que este sector representa más de la mitad de la economía chilena y que su porción respecto al PIB ha aumentado de un 51,97% en 1996 a un 52,42% en 2003, mostrando una tasa de crecimiento similar a la de la economía del país en su conjunto. La investigación concluye que, a pesar de que Chile es una economía de la información, el país no está incorporando innovación ni desarrollo tecnológico al grado que le permita un crecimiento de su productividad en el largo plazo.

palabras clave: Economía de la informaciom, sector servicios, economía chilena.

Abstract

This paper presents the results of research aimed at measuring th and structure of the Chilean information economy as well as the experienced by the information sector in this emerging country b 1996 and 2003. Based on Porat and Rubin's research framework also compares Chile with Korea and the United States. The findi that the Chilean information economy represents more than half aggregate economy and that its share of total GNP increased fro in 1996 to 52.42% in 2003, a growth rate commensurate with th economy as a whole. The research concludes that although Chile information economy, it does not incorporate innovation and tec development in a way that would allow long-term growth of pro

Keywords*: Information economy, service sector, Chilean economy*

It is easy to find allusions to the "information economy" in Chile. The concept is used daily by politicians, business leaders, policy makers, and public figures, especially regarding new technology, new media and their implications in the Chilean economic and social landscape.

In industrial terms, however, the concept refers to something much more precise and substantial; the economy of information is that which encompasses all the activities and products that involve transformation and communication of information. But as information is used in almost every economic activity, quantifying and determining its precise value is not an easy task from an accounting perspective, let alone when it involves national or international measurements.

Although a number of Chilean studies have addressed specific issues related to information and communication, such as the adoption of new technology, new media usage, and shifts in the telecommunication industry, there has been little measurement of the country's information economy.

On a global scale, the use of information within organizations has marked a change in society as a whole. The economy has experienced a progressive transition from an industrial production model toward another based on the creation, processing, and application of knowledge (CETIUC, 2007). In the late 1990s, many business leaders, investors, journalists, and politicians became firmly convinced that the world economy was undergoing a fundamental structural change driven by both globalization and the information and communication technology (ICT) revolution (Pohjola, 2002). Jalava and Pohjola (2002) confirmed that both production and the use of ICT were the factors behind the improved economic performance of the United States in the 1990s. Correa (2006) suggests that most industries in the UK have benefited from the incorporation of advances in telecommunications, achieving higher productivity. On the other hand, an insufficiently developed ICT environment can become a potentially major barrier to the development of the business sector in general (Cassimon & Engelen, 2005).

Ashima (2007) and Karmakar (2004) emphasize that new ICTs and information services make global sourcing possible for a variety of activities. This expands the labor supply available to many developed countries and the employment opportunities for labor in emerging market economies, such as Chile. In the Economist Intelligence Unit's *2007 IT Industry Competitiveness Ranking*, Chile is a country described as a "skills-rich emerging market". Countries described as such are expected to challenge today's established performers in some niches, such as services (The Economist Intelligence Unit, 2007).

Although there is considerable evidence of the relationship between the adoption and use of ICT and productivity growth, there have been few efforts to quantify the economic impact of this development in Chile. The first goal of our study is to quantify this impact relative to the total economic activity of the country by using public macroeconomic statistics. The second is to compare our results with other international studies that have followed the same methodology in order to identify similarities and differences among ICT developments in different countries.

Our approach is based on the methodology developed by Porat and Rubin (1977), who quantified the United States information economy with data from 1967. The same methodology was used by Apte and Nath (2004) to assess the U.S. information economy size, structure, and growth in 1992 and 1997. Porat and Rubin measures are based on public information, such as the national income accounting framework, so this approach is relatively simple to replicate on an international level. This method is limited, however, in that in most countries public data is published with less disaggregation than in the US, and many of the information activities that can only be identified at a detailed level of disaggregation are not explicitly described in public data.

The methodology uses "value added" as a measure of an industry's contribution to GNP. Porat and Rubin's methodology is based on measuring GNP by income, not by product sales (Income Approach). Although the total for each of these measurements will be the same for the overall economy, the total for individual industries can vary substantially. They justify the use of "value added" for the following reasons:

1 We are gratef
financial suppor
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of the University
Business Schoo
Apte of SMU, an
Karmarkar of U
invaluable help

> "First, it allows the researcher to measure the cost of the secondary information sector services directly. Second, value added is a more accurate measure of wealth and income originating in the economy since it is insensitive to the cost of goods sold. An item with costly intermediate purchases will 'sell' more to final demand since its output price will be correspondingly higher. Two goods with identical wealth generating attributes could have very different demand sales, depending on the use of the item" (Porat and Rubin, 1977).

ICT STUDIES IN EMERGING MARKET ECONOMIES

In recent years a number of research projects using different approaches have measured the development and usage of information in society. According to the worldwide "Information Society Index," Chile ranks 29th out of 53 countries, but it is still the highest ranked in Latin America (IDC, 2004). The index is based on IT spending, Internet usage, telecommunications (e.g., broadband penetration), and other factors such as the use of information in education and the government.

The CELA/IESE Business School and Everis (2007) presented a study on the development of the information society in Latin America that also indicates that Chile leads the information society development index in the region. It emphasizes statistics such as the number of computers per capita (197 per 1000 inhabitants) and cell phone penetration (767 of 1000 people own one). In relation to its population, Chile has the greatest number of computers, servers, and Internet users, as well as the largest expenditure on information technologies of the five countries considered in this study: Argentina, Brazil, Chile, Colombia and Mexico, although little effort has been made to quantify the economic impact of these trends in Chile.

METHODOLOGY

Concepts and definitions

Porat and Rubin divide the economy into two different but inseparable domains. The first is considered to be the transformation of matter and energy from one pattern into another, while the second is the transformation of patterns of information. This second domain is

conceived of as an "information economy" ba
concepts of "information," which Porat and R
as "data that have been organized and comm
and the concept of "economic activity," whose
al definition is "all the workers, machineries,
services that are used in processing, manipu
transmitting information" (Porat & Rubin, 1

According to Apte and Nath (2004), Porat
divide the information economy into two m
the primary information sector (PRIS) and t
ary information sector (SIS). PRIS refers to al
tries that produce goods and services that i
convey information or that are directly used
ing, processing, or distributing information f
lished market. It includes the following broa
categories, each composed of a significant nu
dustries. (1) Production of Knowledge and
private research and development and priva
tion services; (2) Distribution of Information
munication: education, public information
telecommunications; (3) Risk Management:
financial industry, and others; (4) Search a
nation: brokerage industries, and advertisi
others; (5) Information Processing and Tr
Services: computer based information proce
communications infrastructure, etc.; (6) I
Goods: calculators, semiconductors, comp
other devices; (7) Selected Governmental Ac
ucation, postal service, and public health ma
(8) Support Facilities: buildings, office furn
(9) Wholesale Trade and Retail of informa
and services.

On the other hand, SIS is defined to incl
information services produced for internal
tion by the government and non-information
rat & Rubin, 1977). It comprises *most* of the
all of the private bureaucracy. It includes the
ganizing firms, maintaining and regulating m
veloping and transmitting prices, monitorin
behavior and making and enforcing rules. (P
bin, 1977).

However, as public bureaucracy compri
informational functions of the national and
ernments, those portions that have direct an

primary information sector are entered in the primary sector for accounting purposes. For example, a significant portion of the public bureaucracy is the public education, which is included in the primary sector (Apte & Nath, 2004).

Private bureaucracy, on the other hand, is the portion of every non-information company that is purely involved in information tasks. This portion of the company produces information services similar to those in the PRIS, such as data processing. Conceptually, these are the informational costs of providing a non-information good. In any case, these information services are not sold on the market and are therefore included in the SIS.

Data Sources

The primary data sources for this study are the Input-Output (I-O) tables for 1996 and 2003 that were compiled and developed by the Central Bank of Chile (Banco Central de Chile, 2001 and 2006, respectively). As of this writing, the 2003 I-O table remains the most current table available.

Other important sources of data released by Chile's National Institute of Statistics (INE) are the National Employment Survey for 1996 and for 2003 (published in 1996 and 2004, respectively) and the Yearly Report on Average Costs and Remunerations 1993–2001, and the subsequent report for 2003 (2002 and 2004, respectively).

Initial efforts were made to include the years 1977 and 1986 in this study, but were later discarded because some of the data was compiled using a very different methodology, and public data on employment and remunerations were not available for those years.

Measuring primary information sector

The Chilean I-O tables for 1996 and 2003 are disaggregated to a level of 73 industries. The industry classifications used in the Chilean I-O tables are not strictly the same as those used by Porat and Rubin (1977) or by Apte and Nath for 1992 and 1997 because the classification of industries in the U.S. I-O tables has undergone variations. However, because relationships between industry classifications in the U.S. and Chile can be established, the studies are therefore comparable.

Two criteria are used to establish the value added portion that corresponds to PRIS in each of the 73 industries. The first is to allocate the complete value added of an industry to the PRIS. This happens when the description of the industry corresponds to what Porat and Rubin identify as belonging to the PRIS entirely (information-based industry).

More often, only a part of an industry's value added is identified as information based. Therefore, the second criterion used is to account for only a part of an industry's value added in the PRIS, according to the following method. For industries that have a direct economic relation with an industry of the U.S. classification, the same proportion of the value added to the PRIS in the U.S. is used in the Chilean study. The methodology for the U.S. identifies information industries at a 6-digit industry level. Apte and Nath identify 87 of the 480 6-digit industries included in the detailed 1992 I-O table as belonging to the PRIS. Chilean I-O tables, with only 73 qualifying industries, are not disaggregated enough to replicate the exact method.

For industries with no direct economic relationship to any of the U.S. classifications, we estimated the portion that corresponds to PRIS by examining source data, work-related literature, and detailed financial report analyses by industry to obtain appropriate approximations. Some information was researched with industry-specific experts in Santiago's Chamber of Commerce.

Measuring the secondary information sector

To measure the non-market information services within non-information industries, Porat and Rubin use a rather restrictive definition of value added that includes (1) employee compensation for information workers, (2) a portion of the proprietors' income and corporate profits earned for performing informational tasks, and (3) capital consumption allowances on information machines.

To measure (1), we used the "occupational group / economic activity" matrices of Chile's "National Employment Survey." These matrices have two dimensions. The first considers 12 economic activities, each of which includes a given number of I-O industries. The second distinguishes 10 occupational groups. To estimate the labor force that corresponds to each I-O industry, we took the number of workers in each cell and divided

them among the corresponding I-O industries in accordance with the proportional contribution of each I-O industry to the GNP, which determined the following occupational groups to be information workers:

- Professionals, technicians, and people in compatible occupations.

- Managers, administrators, and civil employees of directive category.

- Office employees and people in compatible occupations.

- Sales representatives and people in compatible occupations.

- Apte and Nath use a more detailed description for occupations related to information. The occupation classifications used in the Chilean study are rougher, due to the lack of detailed occupation statistics. The average wages for information workers in occupation groups for each economic activity were taken from the "Yearbook of Average Remunerations and Costs." The employee compensation of information workers value added is obtained by multiplying the labor force by its corresponding occupational group remuneration for each economic activity.

In order to measure (2), the portion of proprietors' income and corporate profits earned for performing informational tasks, the following method was used. Data on proprietors' income and depreciation allowances per economic activity for 1996 were obtained from I-O tables. The percentage shares of SIS in total proprietors' income and in total depreciation allowances were applied to the 1996 Chilean valued added figures for each economic activity as reported in Table 9.2 of Volume 1 of Porat and Rubin's 1977 study.

To measure (2) in 2003, a slightly different approach was used. The 2003 I-O table reports three components of gross value added for each I-O industry: "Compensation of Employees," "Other Net Indirect Taxes," and "Gross Capital Gains." The "Gross Capital Gains" component primarily includes proprietors' income and depreciation allowances, which were accounted separately in 1996. In order to obtain the right value-added figure for 2003, we need to allocate the 1996 weighted percentage over 2003's "Gross Capital Gains".

It is worth pointing out that this procedure does not take into account the possibility that the in
al activities of the proprietors or relative use
tion capital goods may have increased over
However, by using the above-mentioned pr
very conservative estimation of proprietors'
informational activities and for depreciation
tion capital goods is accounted. In any case
items represent only a very small part of th
and therefore this method has a presumab
ble impact on the overall accuracy of the SIS
(Apte & Nath, 2004).

It is also important to mention that while
the value added contributions of different I-O
to the SIS, suitable adjustments were made f
dustries that have already been partially or e
cated to the PRIS in order to avoid counting
value added by PRIS industries twice. To pr
ble counting, the shares of the I-O industrie
in PRIS are used to purge out the pure contr
the industries to the SIS.

In addition to studying the contribution
industries to the information economy value
also interesting and important to estimate a
the growth rates of these industries. For th
1996 value added measures were converte
constant Chilean pesos by using GNP implic
by industries with 2003 as the base year.

Results

As can be seen in Table 1, the Chilean GNP i
an average annual growth rate of 3.23% bet
and 2003. The table shows that "Communic
Transport"[2] was the fastest growing indus
9.19% average annual growth rate, followed
cial Intermediation and Business" (5.74%)
(5.33%), "Home Ownership" (4.42%) and "
and Retail Trade, Restaurants, and Hotels
All other industries grew more slowly than
gate economy between 1996 and 2003, esp
"Manufacturing Industry" and "Construction
smallest growth rates), which translated int
shrinkage of these sectors within the econo
shows the industries' shares of GNP in orde
stand the structure of the Chilean economy.

2 "Communications and Transport" are grouped together because they are considered to be part of the same sector from the perspective of their accountable Input-Output matrix.

Table 1. Total GNP and Average Annual Growth Rate

	(Values in millions of 2003 Chilean pesos)			
	Industry	1996	2003	Average annual growth rate
1	Agriculture and Forestry	1,504,916	1,842,431	2.93%
2	Fishing	521,416	627,436	2.68%
3	Mining	3,005,304	4,321,571	5.33%
4	Manufacturing Industry	8,099,408	8,398,990	0.52%
5	Electric, Gas and Sanitary Services	1,198,625	1,461,211	2.87%
6	Construction	3,698,995	3,531,382	-0.66%
7	Wholesale and Retail Trade, Restaurants and Hotels	3,928,681	4,950,883	3.36%
8	Communications and Transport	2,545,726	4,711,435	9.19%
9	Financial Intermediation and Business Services	5,177,396	7,650,975	5.74%
10	Home Ownership	2,199,590	2,977,723	4.42%
11	Social and Personal Services	5,130,407	5,911,639	2.05%
12	Public Administration	1,901,937	2,214,717	2.20%
	Total	38,912,400	48,600,393	3.23%

Table 2. Chile GNP composition (12 Industry Classification)

	Industry	Industry Share in GNP 1996	Industry Share in GNP 2003
1	Agriculture and Forestry	3.87%	3.79%
2	Fishing	1.34%	1.29%
3	Mining	7.72%	8.89%
4	Manufacturing Industry	20.81%	17.28%
5	Electric, Gas and Sanitary Services	3.08%	3.01%
6	Construction	9.51%	7.27%
7	Wholesale and Retail Trade, Restaurants and Hotels	10.10%	10.19%
8	Communications and Transport	6.54%	9.69%
9	Financial Intermediation and Business Services	13.31%	15.74%
10	Home Ownership	5.65%	6.13%
11	Social and Personal Services	13.18%	12.16%
12	Public Administration	4.89%	4.56%

SIZE AND STRUCTURE OF THE CHILEAN INFORMATION ECONOMY

Table 3 presents the value added contributions of primary and secondary information sectors to the GNP. In 1996, 51.97% of the GNP was generated in the information sector: 28.41% by the PRIS sector and 23.56% by the SIS sector. In 2003, the information sector accounted for 52.42% of the Chilean GNP, with PRIS and SIS contributions of 30.48% and 21.94% resp

The information sector share experience ate growth of 0.45% of the GNP from 1996 to 51.97% to 52.42%). This is mainly due to the formation sector share, which grew 2.07% o (from 28.41% to 30.48%). On the other han ondary information sector share experienced of 1.62% between those years (from 23.56%

Table 3. Value Added of Primary and Secondary information sectors

Sector	1996 Value added MM CL$	1996 Share in GNP (%)	2003 Value Added MM CL$	2003 Share in G
PRIS	11,055,740	28.41%	14,812,909	30.48%
SIS	9,168,768	23.56%	10,665,204	21.94%
Information VA	20,224,508	51.97%	25,478,113	52.42%
Non-information VA	18,687,892	48.03%	23,122,280	47.58%
GNP	38,912,400	100.00%	48,600,393	100.00%

Values in millions of 2003 Chilean pesos

Figure 1. PRIS, SIS, and Non-Information shares in GNP and Value Added in millions of Chilean

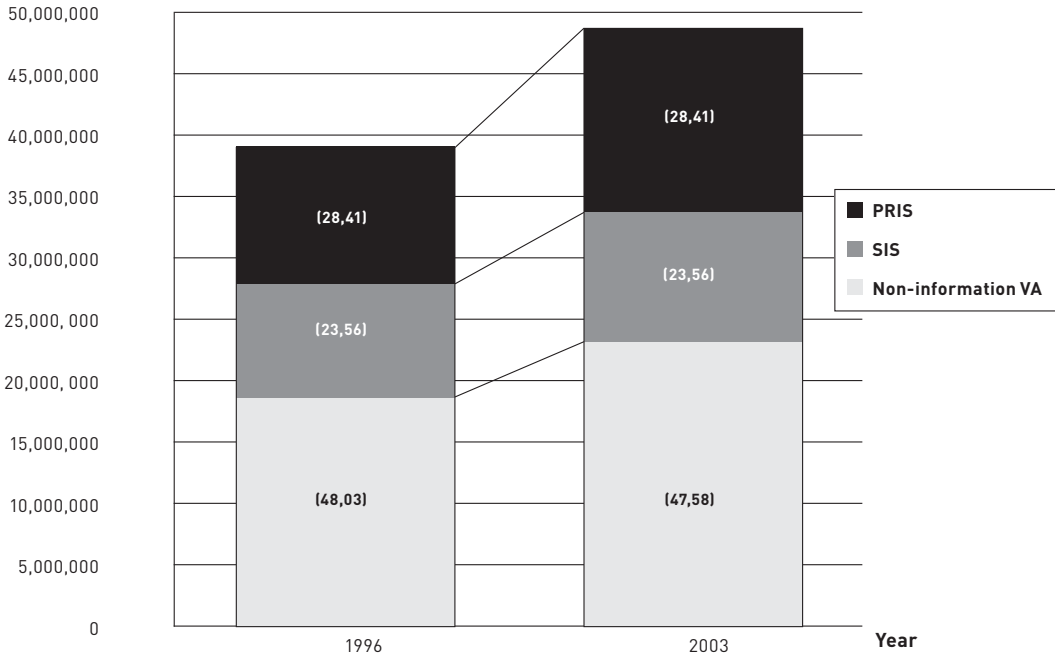


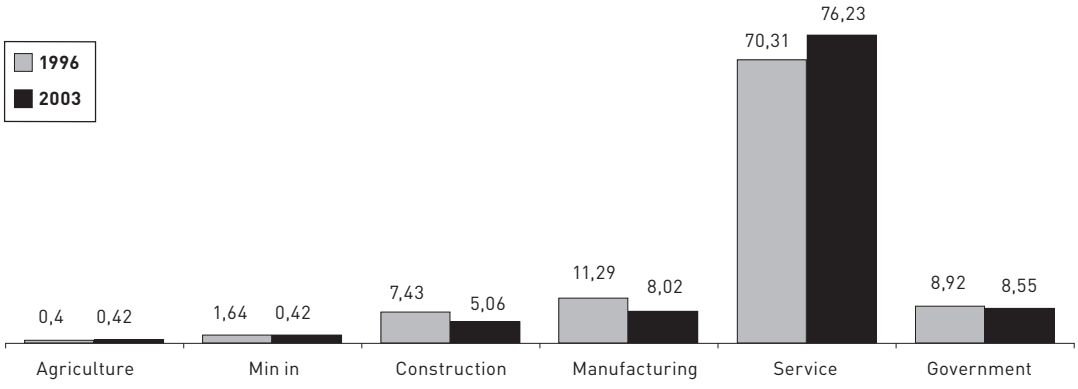
Table 4. Broad Categories Value Added to PRIS and SIS

Industry	1996 PRIS	1996 SIS	1996 Information Economy	2003 PRIS	2003 SIS	2003 Information Economy
Agriculture, Forestry and Fishing	0.00%	0.91%	0.41%	0.00%	1.01%	0.42%
Mining	0.00%	3.61%	1.64%	0.00%	4.11%	1.72%
Construction	6.02%	9.13%	7.43%	4.29%	6.13%	5.06%
Manufacturing	5.43%	18.37%	11.29%	3.24%	14.65%	8.02%
Services	85.97%	51.42%	70.31%	90.23%	56.78%	76.23%
Government	2.58%	16.56%	8.92%	2.24%	17.32%	8.55%
Total	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Table 4 shows the value added contributions of major economic activities to the PRIS, SIS, and the total information economy, in accordance with the broad categories defined by Apte & Nath (2004) for the U.S. information economy.

Table 4 shows that the "Services" industry corresponds to the largest accounted share in both primary and secondary information sectors, with an increase in both PRIS and SIS. The share of "Services" in PRIS rose from 85.97% in 1996 to 90.23% in 2003, while SIS experienced a similar increase from 51.42% in 1996 to 56.78% in 2003. For the entire information economy, the share of "Services" was 70.31% in 1996 and reached 76.23% in 2003. See Figure 2. This demonstrates that the information economy in Chile is primarily based on "Services," which can be explained by a relative slow paced adoption of information activities in other economical industries other than this sector.

Figure 2. Broad Sector Shares in the Chilean Information Economy.



The emergence of new information services and the outsourcing of many traditional "in-house" services of this kind by non-information firms may have also contributed to the faster growth of the "Services" share in the information economy. Detailed information about use and access of ICT and related services by Chilean companies can be found in a number of studies, including the ENTI (CETIUC, 2007) survey, although further research is needed to gain a more complete understanding of the usage of emerging information
Chile. Table 5 shows a more detailed analy
12-industry classification.

Table 5 shows that "Financial Intermec
Business Services" made the largest cont
PRIS in 1996 and 2003 (42.39% and 46.5
tively). This was followed by the contributio
and Personal Services," which mainly inclu
and education services (32.84% in 1996 a

Table 5. Industry Shares in PRIS, SIS and Total Information Economy

	Industry	1996 PRIS	1996 SIS	1996 Information Economy	2003 PRIS	2003 SIS	Info Ec
1	Agriculture and Forestry	0.00%	0.68%	0.31%	0.00%	0.75%	
2	Fishing	0.00%	0.23%	0.11%	0.00%	0.26%	
3	Mining	0.00%	3.61%	1.64%	0.00%	4.11%	
4	Manufacturing industry	5.43%	18.37%	11.29%	3.24%	14.65%	
5	Electric, Gas and Sanitary Services	0.00%	2.60%	1.18%	0.00%	2.25%	
6	Construction	6.02%	9.13%	7.43%	4.29%	6.13%	
7	Wholesale and Retail Trade, Restaurants and Hotels	6.75%	26.07%	15.51%	6.55%	25.30%	
8	Communications and Transportation	4.00%	6.85%	5.29%	7.90%	13.27%	
9	Financial Intermediation and Business Services	42.39%	2.79%	24.44%	46.53%	3.10%	
10	Home Ownership	0.00%	0.00%	0.00%	0.00%	0.00%	
11	Social and Personal Services	32.84%	13.12%	23.90%	29.25%	12.85%	
12	Public Administration	2.58%	16.56%	8.92%	2.24%	17.32%	
	Total	100.00%	100.00%	100.00%	100.00%	100.00%	1

in 2003). In 1996, "Wholesale & Retail Trade, Hotels and Restaurants" was in third place and accounted for 6.75% of PRIS. In 2003, however, "Communications and Transport" placed third by contributing 7.90% of PRIS, which grew from 4.00% in 1996. Within that sector, the only industry that contributes to PRIS is "Communications." Due to the maintained growth of services such as the mobile telephone and broadband, the "Communications" contribution to PRIS in 2003 was almost double that of 1996.

On the other hand, "Wholesale & Retail Trade, Hotels and Restaurants" was the largest contributor (26.07%) to the SIS in 1996, followed by the "Manufacturing Industry" (18.37%) and "Public Administration" (16.56%). In 2003, "Wholesale & Retail Trade, Hotels and Restaurants" retained its first place position (25.30%), but was followed by "Public Administration" (17.32%) and "Manufacturing Industry" (14.65%).

For the entire information economy (PRIS and SIS), the three main contributors have retained their places from 1996 to 2003, as is shown in Figure 2. The largest contributor is "Financial Intermediation and Business Services" (24.44% and 28.35% in 1996 and 2003 respectively), followed by "Personal and Social Services" (23.90% and 22.39% in 1996 and 2003 respectively) and "Wholesale & Retail Trade, Hotels and Restaurants" (15.51% and 14.40% in 1996 and 2003 respectively). The sector that had the greatest share growth was "Communications and Transport," which grew from 5.29% in 1996 to 10.15% in 2003.

Figure 3. The five main contributors to the information economy in 1996 and 2003

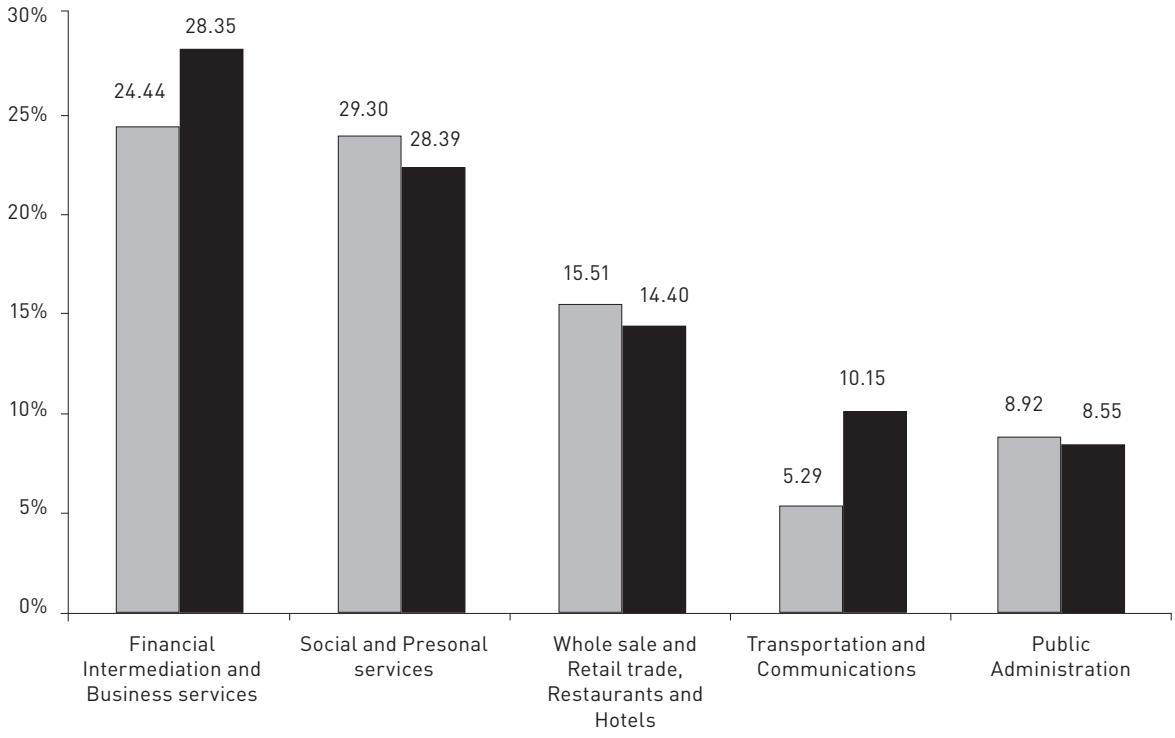


Table 6. Growth of the Chilean Information Economy

Industry	1996	2003	Average Annual Growt
Agriculture and Forestry	62,232	80,012	3.66%
Fishing	21,444	27,196	3.45%
Mining	331,360	438,714	4.09%
Manufacturing Industry	2,284,065	2,042,508	-1.58%
Electric, Gas and Sanitary Services	237,992	239,985	0.12%
Construction	1,502,721	1,289,157	-2.17%
Wholesale and Retail Trade, Restaurants and Hotels	3,135,980	3,669,105	2.27%
Communications and Transportation	1,069,455	2,585,924	13.44%
Financial Intermediation and Business Services	4,942,623	7,222,681	5.57%
Home Ownership	0	0	0.00%
Social and Personal Services	4,833,258	5,703,365	2.39%
Public Administration	1,803,378	2,179,467	2.74%
Total	20,224,508	25,478,113	3.35%

GROWTH OF THE CHILEAN INFORMATION ECONOMY

Table 6 shows that the Chilean information economy, given in 2003 millions of Chilean pesos (MM CL$), grew at an average annual rate of 3.35% between 1996 and 2003.

"Communications and Transport" shows the greatest annual growth rate (13.44%). The information sector in "Finance intermediation and business services" grew 5.57% annually between 1996 and 2003, showing a faster growth than the average for the information economy. As mentioned earlier, this industry is the main contributor to the information economy, so its growing rate is very important to the main results.

Industries of intensive use of natural resources such as "Mining" ,"Agriculture and Forestry," and "Fishing" show growth rates that are slightly greater than the average rate for the information economy. The information activities in "Agriculture and Forestry" and "Fishing" have grown faster than their respective aggregate industry, which means that the information services in those industries have grown faster than their non-information sectors. Contrarily, information activities in
facturing and construction industries exp
decrease between 1996 and 2003, which m
a substantial outsourcing of information a
those industries to foreign providers. A secon
plementary explanation is that the "Constru
"Manufacturing industry" sectors actually d
2003, and information activities are usually
be reduced, resulting in a more rapidly decr
than the sector as a whole.

COMPARISON BETWEEN CHILEAN, U.S., AND K INFORMATION ECONOMIES

While Table 7 presents added value of PRIS
the U.S. Information Economy in 1992 and
values stated in millions of U.S. dollars (Ap
2004), Table 8 does the same in relation to
Information Economy in 1990, 1995, and 20
values stated in millions of Korean Won do
et al., 2006)

Table 7. Value Added Contribution of PRIS and SIS to the U.S. GNP in 1992 and 1997

Sector	1992 Value added MM CL$	1992 Share in GNP (%)	1997 Value Added MM CL$	1997 Share in GNP (%)
PRIS	2,055,950	32.98%	2,940,121	35.23%
SIS	1,427,119	22.89%	2,317,419	27.77%
Information VA	2,055,950	55.87%	5,257,540	63.00%
Non-information VA	-1,427,119	44.13%	3,088,106	37.00%
GNP	6,233,905	100.00%	8,345,646	100.00%

Values in millions of U.S. dollars

Table 8. Value Added Contribution of PRIS and SIS to the Korean GNP in 1990, 1995, and 2000

Sector	1990 Value Added	1990 Share in GNP (%)	1995 Value Added	1995 Share in GNP (%)	2000 Value Added	2000 Share in GNP (%)
PRIS	123,660,003	(40.36%)	198,175,280	45.03%	276,535,854	46.12%
SIS	35,437,394	11.57%	50,645,531	11.51%	77,521,997	12.93%
Information VA	159,097,397	51.93%	248,820,811	56.54%	354,057,851	59.04%
Non-information VA	147,289,941	48.07%	191,229,460	43.46%	245,587,282	40.96%
GNP	306,387,338	100.00%	440,050,271	100.00%	599,645,133	100.00%

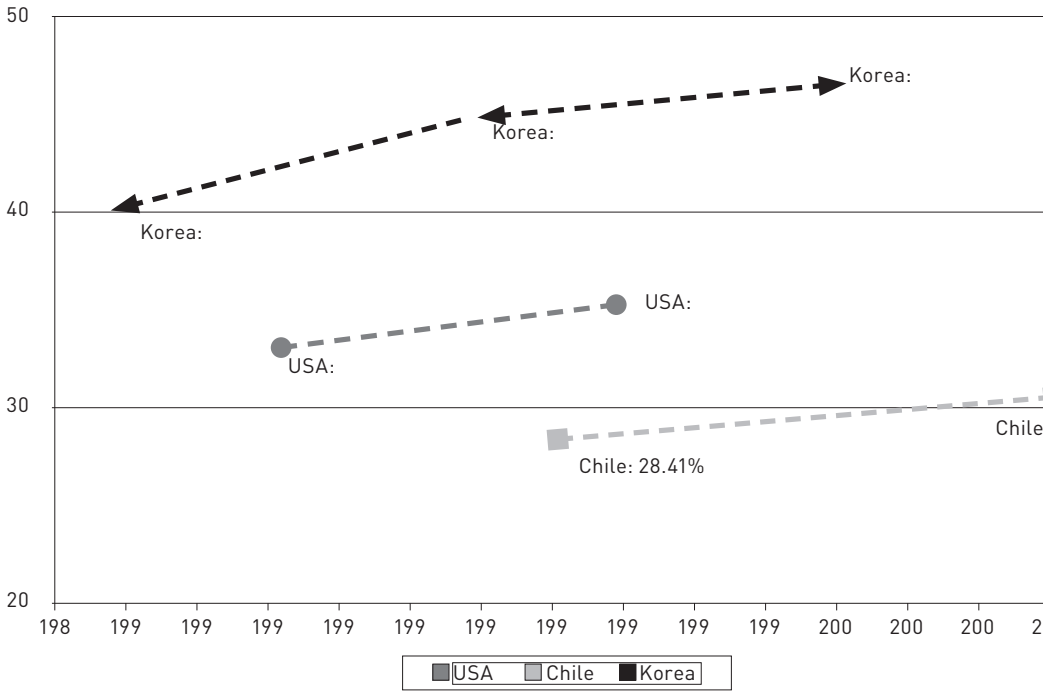
Values in millions of Korean wons

As in Korea and the US, Chile's PRIS sector also grew during this time period. The two developed countries, however, present greater growth rates in the PRIS share of total GNP, while in Chile PRIS grew marginally faster than the aggregate economy. See Figure 4.

Compared to the U.S., the Chilean SIS represents a smaller part of the total value added, as shown in Figure 5. Between 1996 and 2003, the secondary sector reduced its participation in Chile, while it grew in the U.S. On the other hand, Korea's SIS represented a smaller contribution to the total GNP than it did in Chile, but it grew between 1995 and 2000.

In Chile, Korea, and the U.S., the information economy represented more than half of the GNP. But in Korea and the U.S., the information sector share of the total value added was larger than it was in Chile and grew faster than the aggregate economy. See figure 4.

Figure 4. Primary information sector 1990–2003 in Chile, the U.S., and Korea



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In Chile, Korea, and the U.S., the information economy represented more than half of the GNP. But in Korea and the U.S., the information sector share of the total value added was larger than it was in Chile and grew faster than the aggregate economy.

CONCLUSIONS

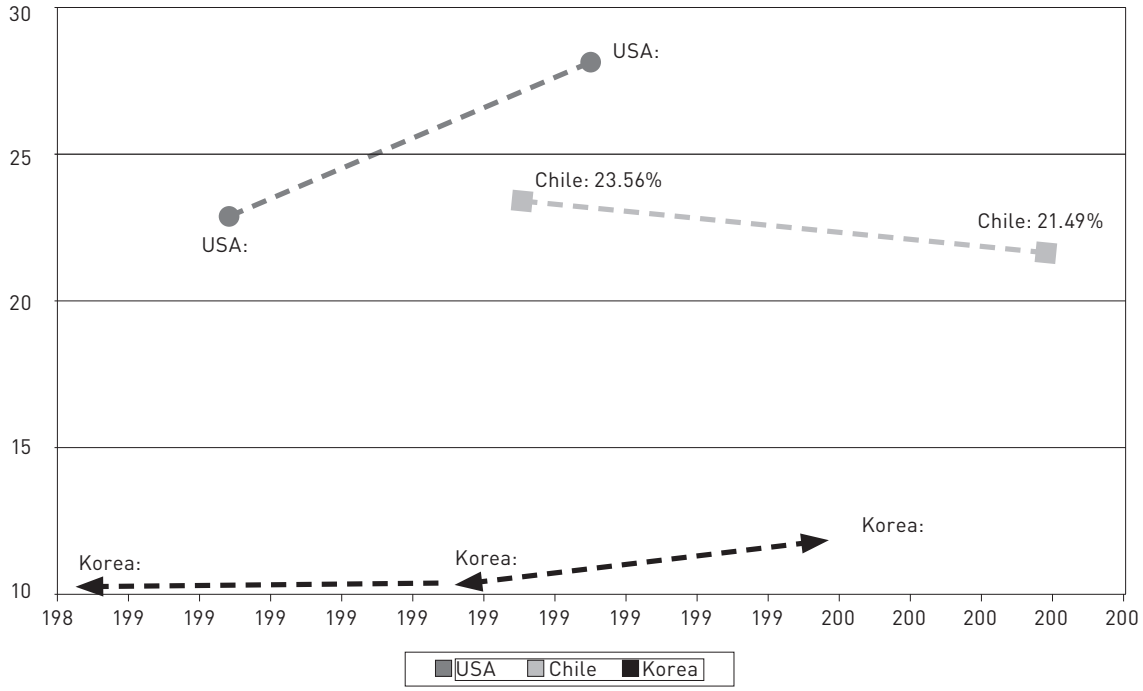
Several important conclusions about the size, structure, and growth of the Chilean Information Economy can be outlined from the analysis. First we present our conclusions on the Chilean results, followed by our conclusions on the international comparison.

Chilean Results

First, more than half of total Value Added i
2003 was generated by information-relate
An economy becomes an information econo
formation-related work begins to exceed wo
the other sectors. The results show that Chi
an information based economy.

The information sector share in total Va
showed a moderate growth of 0.45%. This i
the information economy had a growth simil
the aggregate economy. On the other hand, t
information sector grew faster than the sec
tor between 1996 and 2003. This could be t
the development of new information services
sold in the market or an increase in outsourci
tion services among non-information firms. C
of information services and the decompositi
formation supply chain increase PRIS becau
formation activities are directly sold in the m

Figure 5. Secondary information sector 1990–2003 in Chile, the U.S., and Korea



Within the information economy, the share of "Services" industry increased. "Communications and Transport" registered the highest growth during the period, followed by "Financial Intermediation and Information Services."

Industries with intensive use of natural resources such as "Mining," "Agriculture and Forestry" and "Fishing" also showed a faster growth of information activities than their respective aggregate sectors. Traditionally, Chile's competitive advantage has been the exports of products with intensive use of natural resources, competing primarily by low costs. Recent studies indicate that economies with intensive use of natural resources tend to grow less in the long term than those that develop technologically unless they innovate to fortify their advantages around these resources or build new ones (Tokman and Zahler, 2004). Important challenges for the Chilean economy include incorporating innovation and technological development in sectors with existing competitive advantages, the application of knowledge (which could be originated abroad) in a productive way, and the search for new competitive advantages. These challenges are closely related to the growth of the information economy.

The information economy's moderate growth between 1996 and 2003 is a sign that innovation in Chile is modest and that the country is not incorporating innovation or technological development in a way that would allow long-term growth of productivity. This conclusion is especially relevant because it introduces further fields of research using national accounting and Input-Output tables. A more detailed analysis of the dynamics of relevant information industries, such as telecommunications and media industries, including IT and related services, is suggested.

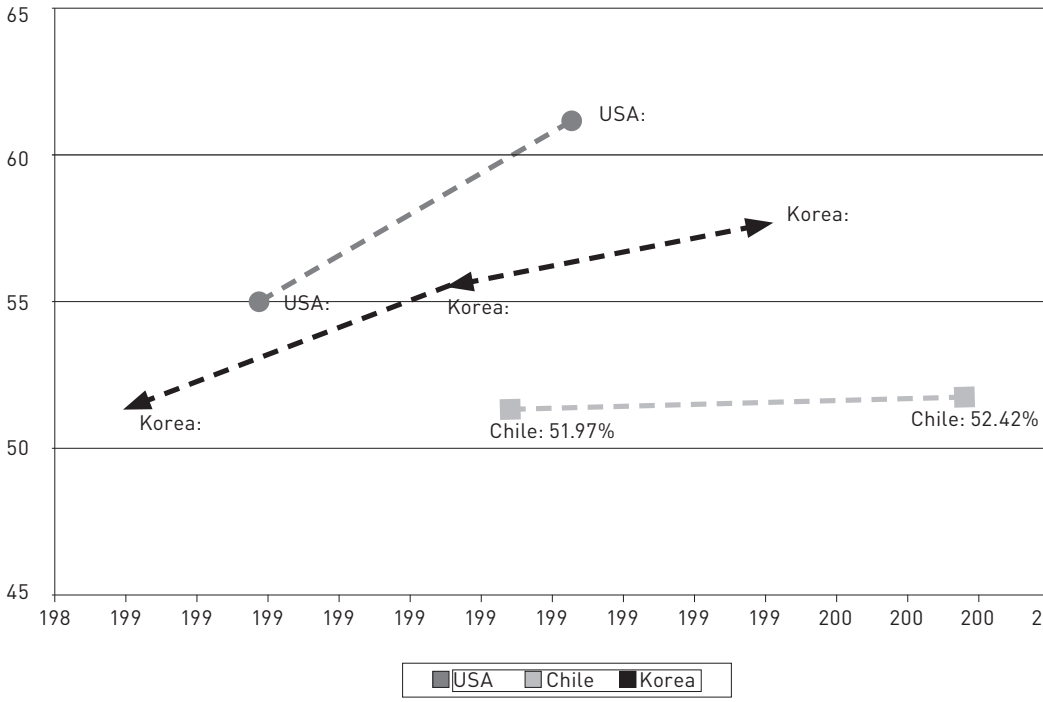


Figure 6. Information Economy 1990–2003 in Chile, the U.S., and Korea

International Comparison

As in the U.S. and Korea, the information economy in Chile accounts for more than half of the total GNP. However, the information contribution to the GNP in Chile (52.42%) is only comparable to the information contribution that the U.S. and Korea experienced in the early 1990s. Chile's PRIS follows a growing pattern similar to that of U.S. and Korea, but at a slower rate. To the contrary, SIS is decreasing its relevance in the total GNP, while it continues to grow slowly in Korea and significantly in the U.S.

It is important to mention that comparisons between countries must be made carefully. National i employment, inflation, investment, and in trade could be affected by economic short-r tions in very different ways in each country study with more current data is important, will allow a confirmation of the trends prese research.

Furthermore, this methodology may be measure the information economy in othe economies in order to establish similarities ences in the economic impact of informatio gies in countries with different growth patte

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