

IMPACT OF NEW ECONOMY IN ASIA AND AFRICA: ICT USAGE AND INVESTMENT APPROACH

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ÖZET

BİT (Bilgi ve İletişim Teknolojileri) dünyayı endüstri devrimi zamanındaki buhar gücü kadar etkilemektedir. BİT kullanımı ve yatırımları bölgesel ve global entegrasyon için önemli bir etmendir. BİT endikatörleri yeni ekonomi penetrasyon düzeyini ve globalleşme düzeyini görmek açısından önemlidir. Yeni ekonomi, mal piyasaları yanında işgücü piyasaları için de fırsatlar sunmaktadır. BİT kullanımı belirli bir eşiği geçtikten sonra verimlilik ve ücret artışını beraberinde getirir.

Bu çalışma, BİT'in Asya ve Afrika üzerindeki etkilerini özetlemeye çalışacaktır. Öncelikle internet kullanım oranları ülke düzeyinde incelenecektir.

Yeni ekonomi açısından internet yaygınlığı en önemli göstergelerden bir tanesidir. Veri bulunabildiği taktirde mobil ve sabit hatlar da analize dahil edilecektir.

Çalışma, BİT kullanımı ve yatırımının Avrupa ve ABD'deki düzeyini inceleyerek son bulacaktır. Avrupa ve ABD'in geçmiş başarıları, Asya ve Afrika için yeni ekonomi yol haritalarında önemli bir belirleyici olacaktır.

Anahtar Kelimeler: Yeni ekonomi, Bilgi İletişim Teknolojileri, internet ekonomisi, çoklu faktör verimliliği

ABSTRACT

ICT (Information Communication Technology) effects the world like a revolution such as steam power in the 18th century. Both the usage and investment in ICT is essential for a regional and global integration. ICT indicators are strong tools of analysing both new economy penetration and global integration of the economy. New economy has challenges in good and services and labour market. After the ICT usage reaches the critical threshold, both productivity and wage rate increases.

This study analyses the effect of ICT (Information communication Technology) on Asia and Africa. The analyses firstly begins with internet usage rates of both Asia and Africa in country detail. The most important indicator in new economy is the internet penetration rate. Except internet usage also, mobile and fixed line phone usage statistics also would take place in terms of communication. Due to availability of data, information technology (hardware and software) investments would be compared.

The study results with the comparison of ICT usage and investments with United States and Europe. The past experience of United States and Europe would be the rational path for Asia and Africa to follow. In other words, the road map of Asia and Africa in transforming to new economy would be determined.

Key Words: New economy, Information Communication Technology, internet economy, multi factor productivity.

INTRODUCTION

It is observed that from 1995 through 1999, real gross domestic product of US economy rose at an annual rate of more than 4 percent (Oliner & Sichel, 2000). On the other hand, unemployment has dropped to historically low rates(3%); the federal government is awash with revenues (Bosworth & Triplett, 2000). Again in accordance with Oliner & Sichel this rapid advance has been driven by growth of labor productivity that depends on hitech usage. They argue that an obvious candidate for this is the high-tech revolution spreading through the U.S. business sector (2000). Moreover, a definition (in line with Oliner & Sichel) of the new economy is cleared out by William D. Nordhaus (2000) as;

The new economy involves acquisition, processing and transformation, and distribution of the information. The three major components are hardware (primarily computers) that process information, the communications systems that acquire and distribute the information, and the software which, with human help, manages the entire system

Increase in the importance of knowledge in the economy, the advent of information industries, as well as other structural changes in the economy have transformed the preconditions for regional development. In many countries today, economic development shows tendencies towards regional concentration. Economically central modern regions often face a migration gain as well as growth of employment and income, whereas the opposite is the case in many peripheral areas. However this picture is by no means uniform, as it is enriched with mosaic like elements and exceptions, ICT is a common utilization for each of those (Jorgenson 2001).

In recent years, the US economy has grown at a surprisingly fast pace, in a phase of expansion that started nine years ago and constitutes the longest-ever recorded period of sustained growth. Moreover, expansion has been marked by low unemployment and record employment but also by low inflation, and an acceleration of productivity growth in the most recent years. This long period of expansion coincides with significant investment in and the diffusion of information and communication technologies (ICT) and their applications.

The term “new economy” has been coined to mark the association of inflation-free growth with computerisation and globalisation, with the

implication that information technologies play a major role in explaining sustained growth (OECD 2000). The notion of the “new economy” has also been employed to signal that the workings of the economy may have significantly changed, with rules, principles and institutions different from those of the “old economy”. A frequently cited example of such new factors is the rising importance of network externalities. Whether a “new economy” in this sense has actually emerged is unclear but the performance of the US economy is uncontested and has been contrasted with growth and employment in many European countries and in Japan (Stiroh 2002).

Table 1: The contribution of the computer industry to US multi-factor productivity growth: Examples from two recent studies

	Oliner and Sichel (2000)	Council of Economic Advisors (2000)
Period and coverage	Non-farm business sector, 1996-99	Total economy, 1995-99
Multi-factor productivity growth	1.25% per year	1.04% per year
Contribution from computer industry	0.62% per year (computer sector plus semiconductor sector)	0.39% per year
Contribution from other industries	0.63% per year	0.65% per year

Source: Oliner and Sichel 2001

Table 2: World internet usage and population statistics

World Regions	Population (2007 Est.)	Population % of World	Internet Usage, Latest Data	% Population (Penetration)	Usage % of World	Usage Growth 2000-2007
Africa	933,448,292	14.2 %	33,334,800	3.6 %	3.0 %	638.4 %
Asia	3,712,527,624	56.5 %	398,709,065	10.7 %	35.8 %	248.8 %
Europe	809,624,686	12.3 %	314,792,225	38.9 %	28.3%	199.5 %
Middle East	193,452,727	2.9 %	19,424,700	10.0 %	1.7 %	491.4 %
North America	334,538,018	5.1 %	233,188,086	69.7 %	20.9%	115.7 %
Latin America/Caribbean	556,606,627	8.5 %	96,386,009	17.3 %	8.7 %	433.4 %
Oceania /Australia	34,468,443	0.5 %	18,439,541	53.5 %	1.7 %	142.0 %
WORLD TOTAL	6,574,666,417	100.0 %	1,114,274,426	16.9 %	100.0 %	208.7 %

Source: www.internetworldstats.com.

NOTES: (1) Internet Usage and World Population Statistics were updated on Mar. 10, 2007. (2) Internet usage information comes from data published by Nielsen/NetRatings, by the International Telecommunications Union, by local NICs, and other other reliable sources.

According to both Oliner & Sichel and Council of Economic Advisors, Multi Factor Productivity (MFP) has the greatest impact on growth among others. MFP is the result of meeting of high qualified labour with the high tech (REF). The discussion about the new economy in US has been lasting since year 2000. However, the discussion is just about the existence of new economy not the growth statistics and calculations.

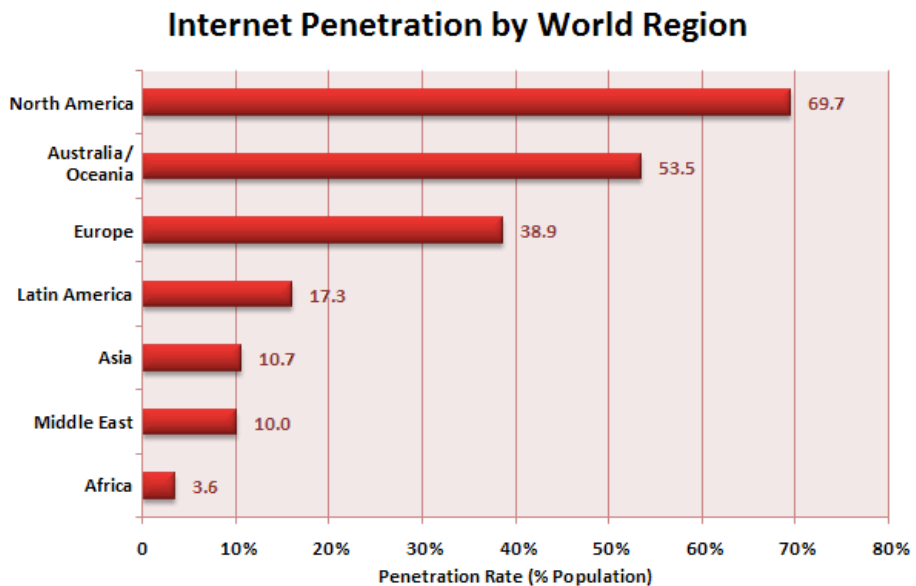
The growth by or with ICT experience of US is a reference for Europe and other regions of the world. The study continues with the internet statistics of the world as an indicator of new economy.

Internet Statistics

Internet penetration rate is one of the most used ICT indicators. It roughly shows the level of ICT usage. It may be low both because of infrastructure and communication strategy.

If someone use the data in Table 2 and convert it to a graph, then Figure 1 is formed.

Figure 1:



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It is easily seen from the figure 1 that, there is a huge gap between Africa-Asia group and then others. If one realizes a correlation analysis between Population% of World and % Population (Penetration) the result is “-0.36”, which is a low correlation.

Africa is the the second-largest continent, after Asia, in size and population; located south of Europe and bordered to the west by the Atlantic Ocean and to the east by the Indian Ocean.

In **Table 3** and **Table 4**, the values is not sufficient but the use growth statistics is optimistic for the future. Algeria, Egypt, Morocco, Nigeria, South Africa and Sudan is better than others.

Table 3: Internet Users and Population Statistics for Africa

AFRICA REGION	Population (2007 Est.)	Pop. % in World	Internet Users, Latest Data	Penetration (% Population)	% Users in World	Use Growth (2000-2007)
Total for Africa	933,448,292	14.2 %	33,334,800	3.6 %	3.0 %	638.4 %
Rest of World	5,641,218,125	85.8 %	1,080,939,626	19.2 %	97.0 %	203.2 %
WORLD TOTAL	6,574,666,417	100.0 %	1,114,274,426	16.9 %	100.0 %	208.7 %

Source: www.internetworldstats.com.

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Table 4 : Internet Usage Statistics for Africa

AFRICA	Population (2007 Est.)	Internet Users Dec/2000	Internet Users, Latest Data	% Population (Penetration)	(%) Users in Africa	Use Growth (2000-2007)
Algeria	33,506,567	50,000	1,920,000	5.7 %	5.8 %	3,740.0 %
Angola	13,313,553	30,000	85,000	0.6 %	0.3 %	183.3 %
Benin	7,714,766	15,000	425,000	5.5 %	1.3 %	2,733.3 %
Botswana	1,893,526	15,000	60,000	3.2 %	0.2 %	300.0 %
Burkina Faso	12,318,213	10,000	64,600	0.5 %	0.2 %	546.0 %
Burundi	8,075,188	3,000	40,000	0.5 %	0.1 %	1,233.3 %
Cameroon	17,775,743	20,000	250,000	1.4 %	0.7 %	1,150.0 %
Cape Verde	494,034	8,000	29,000	5.9 %	0.1 %	262.5 %

Central African Rep.	3,307,622	1,500	11,000	0.3 %	0.0 %	633.3 %
Chad	8,915,381	1,000	40,000	0.4 %	0.1 %	3,900.0 %
Comoros	681,800	1,500	20,000	2.9 %	0.1 %	1,233.3 %
Congo	3,774,537	500	50,000	1.3 %	0.1 %	9,900.0 %
Congo, Dem. Rep.	60,226,717	500	140,600	0.2 %	0.4 %	28,020.0 %
Cote d'Ivoire	20,169,352	40,000	200,000	1.0 %	0.6 %	400.0 %
Djibouti	790,709	1,400	10,000	1.3 %	0.0 %	614.3 %
Egypt	72,478,498	450,000	5,000,000	6.9 %	15.0 %	1,011.1 %
Equatorial Guinea	1,120,061	500	7,000	0.6 %	0.0 %	1,300.0 %
Eritrea	4,254,498	5,000	80,000	1.9 %	0.2 %	1,500.0 %
Ethiopia	73,872,056	10,000	164,000	0.2 %	0.5 %	1,540.0 %
Gabon	1,461,679	15,000	67,000	4.6 %	0.2 %	346.7 %
Gambia	1,508,727	4,000	49,000	3.2 %	0.1 %	1,125.0 %
Ghana	21,801,662	30,000	401,300	1.8 %	1.2 %	1,237.7 %
Guinea	8,171,096	8,000	50,000	0.6 %	0.1 %	525.0 %
Guinea-Bissau	1,492,189	1,500	31,000	2.1 %	0.1 %	1,966.7 %
Kenya	35,062,192	200,000	1,111,000	3.2 %	3.3 %	455.5 %
Lesotho	2,513,076	4,000	43,000	1.7 %	0.1 %	975.0 %
Liberia	3,146,406	500	1,000	0.03 %	0.0 %	100.0 %
Libya	6,293,910	10,000	205,000	3.3 %	0.6 %	1,950.0 %
Madagascar	18,996,075	30,000	100,000	0.5 %	0.3 %	233.3 %
Malawi	11,553,163	15,000	52,500	0.5 %	0.2 %	250.0 %
Mali	10,914,989	18,800	60,000	0.5 %	0.2 %	219.1 %
Mauritania	2,959,592	5,000	20,000	0.7 %	0.1 %	300.0 %
Mauritius	1,292,309	87,000	300,000	23.2 %	0.9 %	244.8 %
Mayotte (FR)	194,785	-	-	-	-	n/a
Morocco	30,534,870	100,000	4,600,000	15.1 %	13.8 %	4,500.0 %
Mozambique	20,356,242	30,000	138,000	0.7 %	0.4 %	360.0 %

Namibia	2,083,405	30,000	75,000	3.6 %	0.2 %	150.0 %
Niger	12,533,242	5,000	29,000	0.2 %	0.1 %	480.0 %
Nigeria	162,082,868	200,000	5,000,000	3.1 %	15.0 %	2,400.0 %
Reunion (FR)	802,911	130,000	220,000	27.4 %	0.7 %	69.2 %
Rwanda	8,959,095	5,000	50,000	0.6 %	0.1 %	900.0 %
Saint Helena (UK)	4,662	-	1,000	21.5 %	0.0 %	0.0 %
Sao Tome & Principe	173,942	6,500	20,000	11.5 %	0.1 %	207.7 %
Senegal	11,069,755	40,000	540,000	4.9 %	1.6 %	1,250.0 %
Seychelles	84,927	6,000	21,000	24.7 %	0.1 %	250.0 %
Sierra Leone	5,159,619	5,000	10,000	0.2 %	0.0 %	100.0 %
Somalia	12,448,179	200	90,000	0.7 %	0.3 %	44,900.0 %
South Africa	49,660,502	2,400,000	5,100,000	10.3 %	15.3 %	112.5 %
Sudan	36,618,745	30,000	2,800,000	7.6 %	8.4 %	9,233.3 %
Swaziland	1,173,758	10,000	36,000	3.1 %	0.1 %	260.0 %
Tanzania	38,870,348	115,000	333,000	0.9 %	1.0 %	189.6 %
Togo	5,527,332	100,000	300,000	5.4 %	0.9 %	200.0 %
Tunisia	10,342,253	100,000	953,000	9.2 %	2.9 %	853.8 %
Uganda	28,574,909	40,000	500,000	1.7 %	1.5 %	1,150.0 %
Western Sahara	456,348	-	-	-	-	0.0 %
Zambia	11,486,812	20,000	231,000	2.0 %	0.7 %	1,055.0 %
Zimbabwe	12,398,897	50,000	1,200,000	9.7 %	3.6 %	2,300.0 %
TOTAL AFRICA	933,448,292	4,514,400	33,334,800	3.6 %	100.0 %	638.4 %

Source: www.internetworldstats.com.

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The low rate of penetration in Africa is a result of the ICT infrastructure of the continent. Although, the geography is convenient for infrastructure investments, since it is not full of mountains, investment in ICT is very inappropriate. Internet usage is a culture and part of daily life it substitutes many things. Internet make the life easy, you save time and many processes. In Africa

it is different, the priority is not an time saving easy life, the priority is on surviving.

Table 5: Internet Users and Population Statistics for Asia

ASIA REGION	Population (2007 Est.)	% Pop. of World	Internet Users, Latest Data	Penetration (% Population)	% Usage of World	Use Growth (2000-2007)
Asia Only	3,712,527,624	56.5 %	398,709,065	10.7 %	35.8 %	248.8 %
Rest of the World	2,862,138,793	43.5 %	715,565,361	25.0 %	64.2 %	190.1 %
WORLD TOTAL	6,574,666,417	100.0 %	1,114,274,426	16.9 %	100.0 %	208.7 %

Source: www.internetworldstats.com.

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Table 6: Asia Internet Usage and Population

ASIA	Population (2007 Est.)	Internet Users, (Year 2000)	Internet Users, Latest Data	Penetration (% Population)	(% Users in Asia)	Use Growth (2000-2007)
Afganistan	27,089,593	-	300,000	1.1 %	0.1 %	n/a %
Armenia	2,950,060	30,000	161,000	5.5 %	0.0 %	436.7 %
Azerbaijan	8,448,260	12,000	678,800	8.0 %	0.2 %	5,556.7 %
Bangladesh	137,493,990	100,000	370,000	0.3 %	0.1 %	270.0 %
Bhutan	812,184	500	25,000	3.1 %	0.0 %	4,900.0 %
Brunei Darussalem	403,500	30,000	135,000	33.5 %	0.0 %	350.0 %
Cambodia	15,507,538	6,000	41,000	0.3 %	0.0 %	583.3 %
China	1,317,431,495	22,500,000	137,000,000	10.4 %	34.4 %	508.9 %

East Timor	958,662	-	1,000	0.1 %	0.0 %	0.0 %
Georgia	4,389,004	20,000	175,600	4.0 %	0.0 %	778.0 %
Hong Kong *	7,150,254	2,283,000	4,878,713	68.2 %	1.2 %	113.7 %
India	1,129,667,528	5,000,000	40,000,000	3.5 %	10.0 %	700.0 %
Indonesia	224,481,720	2,000,000	18,000,000	8.0 %	4.5 %	800.0 %
Japan	128,646,345	47,080,000	86,300,000	67.1 %	21.6 %	83.3 %
Kazakhstan	14,653,998	70,000	400,000	2.7 %	0.1 %	471.4 %
Korea, North	23,510,379	-	-	-	-	n/a %
Korea, South	51,300,989	19,040,000	34,120,000	66.5 %	8.6 %	79.2 %
Kyrgystan	5,436,608	51,600	280,000	5.2 %	0.1 %	442.6 %
Laos	5,826,271	6,000	25,000	0.4 %	0.0 %	316.7 %
Macao*	500,631	60,000	201,000	40.1 %	0.1 %	235.0 %
Malaysia	28,294,120	3,700,000	13,528,200	47.8 %	3.4 %	265.6 %
Maldives	303,732	6,000	19,000	6.3 %	0.0 %	216.7 %
Mongolia	2,601,641	30,000	268,300	10.3 %	0.1 %	794.3 %
Myanmar	54,821,470	1,000	300,000	0.5 %	0.1 %	29,900.0 %
Nepal	25,874,519	50,000	225,000	0.9 %	0.1 %	350.0 %
Pakistan	167,806,831	133,900	12,000,000	7.2 %	3.0 %	8,861.9 %
Philippines	87,236,532	2,000,000	7,820,000	9.0 %	2.0 %	291.0 %
Singapore	3,654,103	1,200,000	2,421,000	66.3 %	0.6 %	101.8 %
Sri Lanka	19,796,874	121,500	280,000	1.4 %	0.1 %	130.5 %
Taiwan	23,001,442	6,260,000	14,500,000	63.0 %	3.6 %	131.6 %
Tajikistan	6,702,382	2,000	5,000	0.1 %	0.0 %	150.0 %
Thailand	67,249,456	2,300,000	8,420,000	12.5 %	2.1 %	266.1 %
Turkmenistan	6,886,825	2,000	36,000	0.5 %	0.0 %	1,700.0 %
Uzbekistan	26,607,252	7,500	880,000	3.3 %	0.2 %	11,633.3 %
Vietnam	85,031,436	200,000	14,913,652	17.5 %	3.7 %	7,356.8 %
TOTAL ASIA	3,712,527,624	114,303,000	398,709,065	10.2 %	100.0 %	248.8 %

Source: www.internetworldstats.com.

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According to internet penetration Asia is better than Africa. In fact, it would not make any sense in comparing Africa with any continent. The objective of this study is just to show the situation of Africa among others and analyse the growth path of U.S. in ICT.

It would be a good way of analysing Africa by Networked Readiness Index (NRI). It is an OECD report that has been prepared since 2004. The Report uses the Networked Readiness Index to measure the degree of preparation of a nation or community to participate in and benefit from ICT developments. The NRI is composed of three component indexes which assess:

- Environment for ICT offered by a country or community
- Readiness of the community's key stakeholders (individuals, business and governments)
- Usage of ICT among these stakeholders.

If we take the first 10 and last 10 from this report:

Table 7: Networked Readiness Index Variation 2006-2007

Countries	Score 2006	Rank 2006-2007
Denmark	5,71	1
Sweden	5,66	2
Singapore	5,6	3
Finland	5,59	4
Switzerland	5,58	5
Netherlands	5,54	6
United States	5,54	7
Iceland	5,5	8
United Kingdom	5,45	9
Norway	5,42	10

Zambia	2,75	112
Cameroon	2,74	113
Paraguay	2,69	114
Mozambique	2,64	115
Lesotho	2,61	116
Zimbabwe	2,6	117
Bangladesh	2,55	118
Ethiopia	2,55	119
Angola	2,42	120
Burundi	2,4	121
Chad	2,16	122

The last 11 countries are from Africa, this is not a chance just the result of ICT investment in those countries.

While analysing the 1970-2000 period in US. We observed that; MFP, employment and output decreases after oil shock in 1970s. After 1990s by ICT revolution MFP, employment and so output has increased.

Those three macroeconomic variables are very important for an economy. The data for US has been taken from Bureau of Labor Statistic (BLS), it has been eliminated from trend and seasonality by Hodrick-Presscott filter. After those data cleaning processes, Granger Causality testes realized for MFP, employment and output. The results are on the Table 8 below. According to Granger Causality (GC) results there is a mutual causality between MFP and employment, output and employment and MFP and output. It is very interesting that MFP increased with employment, this shows that unskilled labour did not hurt, output also create employment. Those sequences could only take place if HiTech has a complementary relation with skilled labour and total employment has increased by MFP and so output increase, unskilled labour did not hurt. The huge jump in US economy has taken place after 1995. 1995 is the year that electronic transactions started over internet after a 11 % internet penetration. The internet penetration percentage threshold is something 10% for such a new economy model in US.

Table 8 Granger Causality Tests between MFP, employment and output.

Sample: 1970 2000, Lag: 2, Number of Observation: 29		
Null hypothesis:	Hypot. %95 Conf interval	F-Statistics
MFP does not Granger Cause EMPLOYMENT	REJECT	6.03497
EMPLOYMENT does not Granger Cause MFP	REJECT	6.23842
OUTPUT does not Granger Cause EMPLOYMENT	REJECT	5.37862
EMPLOYMENT does not Granger Cause OUTPUT	REJECT	6.47943
OUTPUT does not Granger Cause. MFP	REJECT	5.63401
MFP does not Granger Cause OUTPUT	REJECT	6.08347

CONCLUSION

After the discussion about the new economy evidence in US, one could easily think that it would be a curement for Africa and Asia. Asia took many measures and it is in necessary but not a sufficient place in the world. The ICT infrastructure of Africa is poor so ICT transactions are expensive and costly. For transforming the way of business to digital business the most important indicator is internet. After a certain penetration level, way of doing business digitalized. Between 1996-2000 period real wages increased in ICT sector more than doubled and employment reached 3% . 3 million managerial jobs created and according BLS 64 new job definition formed about the ICT. For Africa the economic growth and liberation is in the wings of new economy. After a perfect ICT infrastructure, manufacturing and software multinational firms would invest in Africa like Asia and Pacific region that they did before.

REFERENCES

- Albert, A. and William, F , 1999 “A Primer on Internet Economics: Macro and Micro Impact of the Internet on Economy”. Business Economics. Vol. 34, Iss 4, pp. 42-50.
- Atkinson, R. D. 2001 “Building Skills for the New Economy” www.ppionline.org
- Berman, E., J. Bound, and S. Machin, 1998 “Implications of Skill-Biased Technological Change: International Evidence.” Quarterly Journal of Economics 113: 1245-79.
- Bosworth, B. P. and J. E. Triplett 2000. What’s New about the New Economy? IT, Economic Growth and Productivity, *Brookings Institution*
- Council of Economic Advisors (2000), *Economic Report* Printing Office, <http://w3.access.gpo.gov/eop/>.

Granger, C. W. J. 1988, "Some Recent Developments in a Concept of Causality", *Journal of Econometrics*, 39(1-2), 199-211.

Gunnarsson, G., E. Mellander Ve E. Savvidou 2001 'Is Human Capital the Key to the IT Productivity Paradox', Working Paper no: 551, The Research Institute of Industrial Economics, Stockholm.

Jorgenson, D.W., 2001b "Information Technology and the U.S. Economy" Discussion Paper Number 1911 Harvard Institute of Economic Research, <http://post.economics.harvard.edu/hier/2001papers/2001list.html>

Litan, R. R. and A. M, Rivlin, 2001 "Projecting the Economic Impact of the Internet", *The American Economic Review*.

Merfield, D. 2000 "Growth Strategies for the 'New' Economy" *Research Technology Management* Nov-Dec pp. 9-12.

Nordhaus, W. D. 2000. *Technology, Economic Growth, and the New Economy*, Yale University OECD, *Information Technology Outlook 2000*.

Oliner, S. D. and Sichel D. E. 2000. *The Resurgence of Growth in the Late 1990's: Is information Technology the Story?*, *Journal of Economic Perspectives*, vol. 14, 3-22.

Schreyer, P., 2000 "The Contribution of Information and Communication Technology to Output Growth: A Study of the G7 Countries", , OECD STI working paper 2000/2.

Stiroh, K.J 2002 "Measuring Information Technology and Productivity in the New Economy" *World Economics* • Vol. 3 • No. 1 January-March.

