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THE IMPACT OF INFORMATION TECHNOLOGY ON THE ECONOMY

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ABSTRACT

While there are large discrepancies between the average incomes of the world's poorest countries in contrast with the world's richest countries, such evidences point out that there are significant differences in human welfare and in the quality of life experienced by people who come from these different countries. In terms of both the poverty of basic choices and opportunities and that of incomes, about one third of the people in various developing countries are experiencing a great deal of poverty. Considering the importance of both human and physical capital, and other such economic factors, developing and developed countries alike have expressed interest in turning to modern information technology (IT) for improved economic growth. The information revolution is said to be brought about by the decline in information processing prices, the developments in network computing, and the merge of computing technologies with communication, and such will hopefully give rise to an economy with knowledge-based services.

Information technology has already changed the face of many activities in organizational, economic, and societal domains, and holds strong promise for future development. Information Technology and Economic Development collects defining research on the impact information technology (IT) has on fields such as politics, education, sociology, and commerce, with a unifying focus on the benefits of IT for developing countries, which have not been clearly defined. By comprehensively treating the challenges and obstacles that must be overcome to achieve further IT advancement in the developing world, this book provides a must-have reference for libraries serving the international research community.

At a time of slowed growth and continued volatility, many countries are looking for policies that will stimulate growth and create new jobs. Information communications technology (ICT) is not only one of the fastest growing industries – directly creating millions of jobs – but it is also an important enabler of innovation and development. The number of mobile

subscriptions (6.8 billion) is approaching global population figures, with 40% of people in the world already online. In this new environment, the competitiveness of economies depends on their ability to leverage new technologies. Here are the five common economic effects of ICT.

1. Direct job creation. The ICT sector is, and is expected to remain, one of the largest employers. In the US alone, computer and information technology jobs are expected to grow by 22% up to 2020, creating 758,800 new jobs. In Australia, building and running the new super-fast National Broadband Network will support 25,000 jobs annually. Naturally, the growth in different segments is uneven. In the US, for each job in the high-tech industry, five additional jobs, on average, are created in other sectors. In 2013, the global tech market will grow by 8%, creating jobs, salaries and a widening range of services and products.

2. Contribution to GDP growth. Findings from various countries confirm the positive effect of ICT on growth. For example, a 10% increase in broadband penetration is associated with a 1.4% increase in GDP growth in emerging markets. In China, this number can reach 2.5%. The doubling of mobile data use caused by the increase in 3G connections boosts GDP per capita growth rate by 0.5% globally. The Internet accounts for 3.4% of overall GDP in some economies. Most of this effect is driven by e-commerce – people advertising and selling goods online.

3. Emergence of new services and industries. Numerous public services have become available online and through mobile phones. The transition to cloud computing is one of the key trends for modernization. The government of Moldova is one of the first countries in Eastern Europe and Central Asia to shift its government IT infrastructure into the cloud and launch mobile and e-services for citizens and businesses. ICT has enabled the emergence of a completely new sector: the app industry. Research shows that Facebook apps alone created over 182,000 jobs in 2011, and that the aggregate value of the Facebook app economy exceeds $$12 billion.

4. Workforce transformation. New “microwork” platforms, developed by companies like oDesk, Amazon and Samasource, help to divide tasks into small components that can then be outsourced to contract workers. The contractors are often based in emerging economies. Microwork platforms allow entrepreneurs to significantly cut costs and get access to qualified workers. In 2012,alone had over 3 million registered contractors who performed 1.5 million tasks. This trend had spillover effects on other industries, such as online payment systems. ICT has also contributed to the rise of entrepreneurship, making it much easier for self-starters to access best practices, legal and regulatory information, marketing and investment resources.

5. Business innovation. In OECD countries, more than 95% of businesses have an online presence. The Internet provides them with new ways of reaching out to customers and competing for market share. Over the past few years, social media has established itself as a powerful marketing tool. ICT tools employed within companies help to streamline business processes and improve efficiency. The unprecedented explosion of connected devices throughout the world has created new ways for businesses to serve their customers.

The application of complexity science tools to the study of society allows for the analysis of phenomena that have been hard to identify and analyze with more traditional tools, especially in the field of Economics, which in the absence of these tools has tended to work with relatively low dimensional representations of reality. But the increasing availability of more detailed information of social phenomena makes it particularly useful to use tools that can exploit this informational richness. This opens up fascinating new horizons on almost all fields of knowledge in the social sciences.

In economics, it is widely accepted that technology is the key driver of economic growth of countries, regions and cities. Technological progress allows for the more efficient production of more and better goods and services, which is what prosperity depends on. However, the mechanisms through which technology is developed, adopted and used in production are complex. Their more detailed analysis can allow for new findings that could have important impacts in many areas of policy, including science policy, research and development, industrial policy, and both national and regional development policies. In fact, the concept of technology itself as well as the individual and social capabilities required for its development ca now be studied at a much more fine-grained level leading to potential contributions that may impact higher education, job creation and economic growth. Clearly, there are links between education, research and development, innovation and economic activity that are part of the process we aim to uncover.

The recent shift towards open innovation has resulted in increased flows of knowledge and new types of cooperation between education institutions, research organizations and business. Top corporate R&D investors worldwide lead the development of many emerging technologies. This is evident from an examination of the technology fields in which these companies intensified their inventive activities in the recent years and the contribution of top R&D investors to the overall development of these fields. Top corporate R&D investors accelerated

their inventive activities in areas such as engines, automated driving systems, big data, artificial intelligence, 3-D printing and information and communication technologies.

It is necessary to remember that the two main ingredients for the development of new technology are codified knowledge in the form of theories, frameworks, scientific papers, patents, recipes, protocols, routines and instruction manuals and tacit knowledge or knowhow, which is acquired through learning by doing in a long process of imitation and repetition and which exists only in brains. The development of science, technology, innovation and production require both codified and tacit knowledge but the codifiable component of science and technology get registered, respectively, in the form of scientific publications and patents, and these are grouped into categories. Scientific publications, patents, industries, occupations and products are proxies of scientific knowledge, technological development, economic activity and human skills.

They form what is known as a multiplex network with six kinds of nodes where geographic location represents the last one. Understanding relations within each layer, e.g., the knowledge space, the patent space, the industry space, the occupation space, the product space and the country (or location space); and across layers should shed light on the foundations of countries economic development and the policies to be implemented in all of these areas to promote it.

Policies towards science, technology and innovation (STI) would benefit enormously from a deeper and more detailed understanding of the 6-fold multiplex that this research wants to uncover. What are the detailed connections between areas of science, as captured by journal publications and patents. What forms of human collaboration are necessary for the authorship of papers and patents? And for national and local authorities: What are the connections between a local effort in science and local innovation? What are the backward linkages of industrial diversification on the local capacity to create patents and scientific papers? Which occupations are key to facilitate the diffusion of industries to particular locations and what are the educational profiles of those occupations? What is the role of human mobility and the attraction of talent in the successful development of STI?

To sum up, this study group pursues three purposes:

To analyze empirically the nature of the partnerships and ecosystem relations that underpin scientific and technological progress and its manifestation in the development of new industries, the appearance of new products and the formation of new teams of people with different and complementary occupations. To do this, we will carry out a research agenda to uncover these connections.

1. To develop tools in order to assess the position of each country and region in the multiplex and its evolution over time in order to evaluate their “adjacent possible” in a way that can help them plan their efforts towards progress.
2. To expand the dimensions that the quantitative tools of CID’s Atlas of Economic Complexity can offer its worldwide users, thus allowing policymakers, corporations, STI participants and the broader public to benefit from the results of the research.

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