

THE ATLAS OF ECONOMIC COMPLEXITY

M A P P I N G P A T H S T O P R O S P E R I T Y



| Ricardo Hausmann | César A. Hidalgo | Sebastián Bustos | Michele Coscia | Alexander Simoes | Muhammed A. Yildirim |

THE ATLAS OF ECONOMIC COMPLEXITY

MAPPING PATHS TO PROSPERITY



AUTHORS:

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FOREWORD TO THE UPDATED EDITION



It has been two years since we published the first edition of *The Atlas of Economic Complexity*. “The Atlas”, as we have come to refer to it, has helped extend the availability of tools and methods that can be used to study the productive structure of countries and its evolution.

Many things have happened since the first edition of *The Atlas* was released at CID’s Global Empowerment Meeting, on October 27, 2011. The new edition has sharpened the theory and empirical evidence of how knowhow affects income and growth and how knowhow itself grows over time. In this edition, we also update our numbers to 2010, thus adding two more years of data and extending our projections. We also undertook a major overhaul of the data. Sebastián Bustos and Muhammed Yildirim went back to the original sources and created a new dataset that significantly improves on the one used for the 2011 edition. They developed a new technique to clean the data, reducing inconsistencies and the problems caused by misreporting. The new dataset provides a more accurate estimate of the complexity of each country and each product. With this improved dataset, our results are even stronger.

The Atlas’ sister site, The Observatory of Economic Complexity (<http://atlas.cid.harvard.edu>), has been significantly improved with the use of the new dataset, the addition of bilateral trade data and the inclusion of trade information classified according to the Harmonized System as well as the more traditional SITC. Also, The Observatory now includes multilingual support, country profiles, bulk data downloads, and a large number of design features, including dynamic text for the treemap visualizations and an improved design of the product space

visualizations. This has been mostly the effort of Alex Simoes, who with the assistance of Crystal Noel developed The Observatory to what it is now. Since it was launched, The Observatory has received more than 125,000 visits from 198 different countries. All in all, the new version of *The Atlas* provides a more accurate picture of each country’s economy, its “adjacent possible” and its future growth potential. ●

P R E F A C E



Over the past two centuries, mankind has accomplished what used to be unthinkable. When we look back at our long list of achievements, it is easy to focus on the most audacious of them, such as our conquest of the skies and the moon. Our lives, however, have been made easier and more prosperous by a large number of more modest, yet crucially important feats.

Think of electric bulbs, telephones, cars, personal computers, antibiotics, TVs, refrigerators, watches and water heaters. Think of the many innovations that benefit us despite our limited awareness of them, such as advances in port management, electric power distribution, agrochemicals and water purification. This progress was possible because we got smarter. During the past two centuries, there has been an explosion of ‘productive knowledge’, by which we mean, the knowledge that goes into making the products we make. This expansion was not, however, an individual phenomenon. It was a collective phenomenon. As individuals we are not much more capable than our ancestors, but as societies we have developed the ability to make all that we have mentioned – and much, much more.

A modern society can amass large amounts of productive knowledge because it distributes bits and pieces of knowledge among its many members. But to make use of it, this knowledge has to be put back together through organizations and markets. Thus, individual specialization begets diversity at the national and global level. Our most prosperous modern societies are wiser, not because their citizens are individually brilliant, but because these societies hold

a diversity of knowhow and because they are able to recombine it to create a larger variety of smarter and better products.

The social accumulation of productive knowledge has not been a universal phenomenon. It has taken place in some parts of the world, but not in others. Where it has happened, it has underpinned an incredible increase in living standards. Where it has not, living standards resemble those of centuries past. The enormous income gaps between rich and poor nations are an expression of the vast differences in productive knowledge amassed by different nations. These differences are expressed in the diversity and sophistication of the things that each of them makes, which we explore in detail in this Atlas.

Just as nations differ in the amount of productive knowledge they hold, so do products. The amount of knowledge that is required to make a product can vary enormously from one good to the next. Most modern products require more knowledge than what a single person can hold. Nobody in this world, not even the savviest geek or the most knowledgeable entrepreneur knows how to make a computer from scratch. We all have to rely on others who know about battery technology, liquid crystals, microprocessor design, software development, metallurgy, milling, lean manufacturing and human resource management, among many other skills. That is why the average worker in a rich country works in a firm that is much larger and more connected than firms in poor countries. For a society to operate at a high level of total productive knowledge, individuals must know different things. Diversity of productive knowledge,

however, is not enough. In order to put knowledge into productive use, societies need to reassemble these distributed bits through teams, organizations and markets.

Accumulating productive knowledge is difficult. For the most part, it is not available in books or on the Internet. It is embedded in brains and human networks. It is tacit and hard to transmit and acquire. It comes from years of experience more than from years of schooling. Productive knowledge, therefore, cannot be learned easily like a song or a poem. It requires structural changes. Just like learning a language requires changes in the structure of the brain, developing a new industry requires changes in the patterns of interaction inside an organization or society.

Expanding the amount of productive knowledge available in a country involves enlarging the set of activities that the country is able to do. This process, however, is tricky. Industries cannot exist if the requisite productive knowledge is absent, yet accumulating bits of productive knowledge will make little sense in places where the industries that require it are not present. This “chicken and egg” problem slows down the accumulation of productive knowledge. It also creates important path dependencies. It is easier for countries to move into industries that mostly reuse what they already know, since these industries require adding modest amounts of productive knowledge. By gradually adding new knowledge to what they already know, countries can economize on the chicken and egg problem. That is why we find empirically that countries move from the products that they already create to others that are “close by” in terms of the productive knowledge that they require.

The Atlas of Economic Complexity attempts to measure the amount of productive knowledge that each country holds. Our measure of productive knowledge can account for the enormous income differences between the nations of the world and has the capacity to predict the rate at which countries will grow. In fact, it is much more predictive than other well-known development indicators, such as those that attempt to measure competitiveness, governance, education and financial depth.

A central contribution of this Atlas is the creation of a map that captures the similarity of products in terms of their knowledge requirements. This map depicts a network of products, and shows paths through which productive knowledge is more easily accumulated. We call this map the product space. Using data on what each country exports, we are able to place where each country's production is located in the product space, illustrating their current productive capabilities and identifying products that lie nearby.

Ultimately, this Atlas views economic development as a social learning process, but one that is rife with pitfalls and dangers. Countries accumulate productive knowledge by developing the capacity to make a larger variety of products of increasing complexity. This process involves trial and error. It is a risky journey in search of the possible. Entrepreneurs, investors and policymakers play a fundamental role in this economic exploration.

By providing rankings, we wish to clarify the scope of the achievable, as revealed by the experience of others. By tracking progress, we offer feedback regarding current trends. By providing maps, we do not pretend to tell potential product space explorers where to go, but to pinpoint what is out there and what routes may be shorter or more secure. We hope this will empower these explorers with valuable information that will encourage them to take on the challenge and thus speed up the process of economic development. ●



▼ RICARDO HAUSMANN

Director, Center for International Development at Harvard University,
Professor of the Practice of Economic Development, Harvard Kennedy School,
George Cowan Professor, Santa Fe Institute.










▼ CÉSAR A. HIDALGO

ABC Career Development Professor, MIT Media Lab,
Massachusetts Institute of Technology (MIT),
Faculty Associate, Center for International Development at Harvard University.


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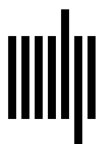
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