

**MTI-CSC Economics Speakers Series**  
**“The Product Space, Capabilities and Growth: Implications for Singapore”**

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**19 January 2008**

### **How Do Countries Grow?**

Most economists tend to look at the gross domestic product (GDP) of a country without looking at the specific goods the country produced. Does it matter what products a country produces? One starting point for Professor Hausmann was the relation between how rich a country was, how fast it grew, and what kinds of products it made.

Professor Hausmann and his colleagues decided to study that relation by looking at the sophistication of the products that a country exports. What they found was that there was a relation between the kinds of products exported by a country and the level of income of that country—rich countries tended to export rich-country products, and poor countries tended to export poor-country products. That in itself was not surprising, but they also found that countries “became” what they exported—they tended to converge to the level of income of their competitors. The more sophisticated their export package, the faster their future growth would be. Professor Hausmann’s findings suggested that for a country to grow, it should change what it produced and move to the more sophisticated goods exported by richer countries.

### **Structural Transformation**

But how was that kind of structural transformation to be achieved? Why were some countries better able to upgrade their exports than others?

Professor Hausmann noted that every product required a large number of specific factors of production. Producing asparagus, for example, required a certain type of soil, mechanised farming equipment, agribusiness firms that know the market, and so on. It also required “public goods”, such as specific property rights, port infrastructure, roads, phytosanitary regulations etc. We could think of the different factors of production required by different products as the distance between them—close products, such as asparagus and artichoke, would require similar factors, while distant products, such as asparagus and medicines, would have require distinct factors.

To measure the distance between products, Professor Hausmann and his colleagues looked at pairs of the products exported by different countries—products A and B are close if countries that are good at producing product A are also good at product B, and distant if countries that are bad at product A are also bad at product B. Mapping all the links between products gave them the *product space*. Professor Hausmann suggested that one way to think about the product space was to think of it as a forest, where every product was a tree, and every company a monkey that lived on trees, and off them.

Professor Hausmann and his colleagues also found that the forest was irregularly shaped. In the dense core of the forest were products like machinery, chemicals and capital-intensive goods, which tended to be produced by richer countries. There were clusters near the core, like electronics and garments, which tended to be produced by less rich countries. The periphery was the sparsest part of the forest and contained products such as mining, fishing, agriculture, which tended to be produced by the poorest countries.

Monkeys could only jump short distances by themselves, because they did not have the capabilities to produce very dissimilar products. This was a chicken-and-egg problem, or a coordination problem—countries needed specific capabilities to develop specific industries, but if those industries were not present to begin with, there was no incentive for firms and workers to develop those capabilities. As a result, monkeys in the richer, denser parts of the forest would have more trees to jump to, but monkeys in the poorer, sparser parts of the forest would not.

We could think of the economic development of countries as their evolution in and colonisation of the product space. To predict their future growth from their position in the product space, we could look at the density of the space they were in, how sophisticated their products and neighbouring products were, and what their most strategic path would be, in terms of jumping to trees that would give them access to the richer, denser parts of the forest and improve their position in the product space. Professor Hausmann suggested that one export strategy seldom used by countries was to follow alternative uses of their capabilities rather than their raw materials, and move to more sophisticated products.

### **Quality Improvements**

Research by Jason Hwang, one of Professor Hausmann's students, found that countries were generally quite good at improving the quality of the products they were making and moving up the trees they were in. The further the monkeys were from the top of their tree, the faster they moved up the branches, and the faster the country could grow. But the speed at which a country grows depended not just on improving the quality of its existing products but also moving to more sophisticated products, and here countries tended to have less success—monkeys did not always land in the trees they jumped to, and even when they did, they often landed in the lower branches of the new tree. But that now meant that they had more space to the top and could grow quite quickly.

### **Policy Implications**

Professor Hausmann advocated a *strategic industrial policy*, which went beyond focusing on the quality of existing activities and being responsive to new or existing to helping monkeys jump to a richer, denser part of the forest that might be too distant for them to jump to by themselves.

Government could help to solve the coordination problem by providing public inputs, such as specific infrastructure, standards, certification, training, funding for research programmes, etc. In Professor Hausmann's experience, public inputs were often the binding constraint on growth, rather than a lack of transfers to the private

sector, because there was no market for public inputs, unlike private inputs, and so government had little incentive or information on the specific inputs needed and how best to provide them.

What governments needed to do, in Professor Hausmann's opinion, was to allocate budget and organisational capacity to create structures and incentives for people and firms to organise themselves, generate ideas and start a dialogue with the government on what kinds of public inputs they needed or what obstacles were in the way of economic development. Development banks and industrial zones could act as "search engines" to help the government find new ideas and stay responsive to the needs of the economy. It was important to keep the policy process transparent, by making all demands and their evaluation public knowledge; that would preserve the legitimacy of the process, help the government to avoid capture by private sector players, and reduce unreasonable demands on the government.

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