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Policies for Achieving Structural Transformation in the Caribbean

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and
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Policies for Achieving Structural Transformation in the Caribbean

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Executive Summary

Countries seldom grow rich by producing the same things more productively. They usually change what they produce in the process of development. Structural transformation is the process whereby countries move to new economic activities that are more productive and thus are able to pay higher wages. This process is very important for growth: countries that are able to upgrade their exports by developing new economic activities tend to grow faster (Hausmann and Rodrik, 2003; Hausmann, Hwang, and Rodrik, 2006).

The purpose of this paper is to apply new methodologies to analyze the history of and future opportunities for structural transformation in the Caribbean. We first look at the composition of exports from the Caribbean, and show that the region is specialized in relatively unsophisticated, “poor-country” export products, and this is not simply a consequence of their small size or specialization in tourism and financial services.

We then review the concept of the “product space” and determine where the Caribbean countries are specialized within this space. The results show that generally these countries export peripheral products that are intensive in capabilities with few alternative uses. In addition, we consider what effects regional integration would have on this opportunity set and show that future opportunities for structural transformation are much higher for the Caribbean Community (CARICOM) as a perfectly integrated zone—higher than for any of its members on their own.

The final section discusses the policy implications of these results. We show that for almost all countries in the Caribbean there is a need to move to new export activities. Some countries in the region have a set of nearby activities they could exploit, including in the services sector, which suggests a parsimonious approach to promoting new activities is appropriate. This approach involves the government better orienting itself to learn what emerging sectors need in the way of publically provided inputs. But for many countries in the region, there are few nearby activities, suggesting a more proactive search process is necessary. In the appendix we apply the product space data to this search for nearby and more distant export activities for Belize and Jamaica. However, such data is merely a starting point for what must be a continuous process of high-bandwidth dialogue with the private sector to learn what is needed for new activities to emerge. We provide general design guidelines for such a dialogue, both for nearby and more distant activities, and we outline some specific initiatives as examples.

Export Composition in CARICOM

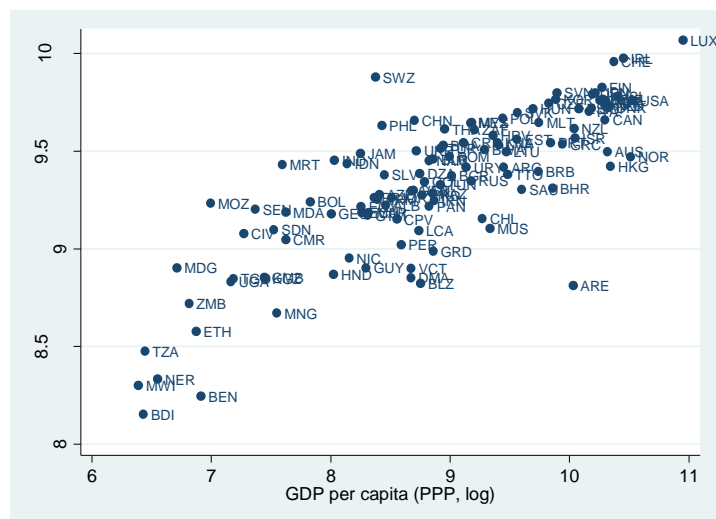
While the actual products comprising a country’s export basket have traditionally taken a back seat to the focus on what were considered more fundamental country characteristics like capital stock and total factor productivity, recent research has suggested that what a country exports matters. Hausmann, Hwang, and Rodrik (2006) find that the composition of a country’s export basket has important implications for economic growth. Countries that are able to move to a more sophisticated export basket given their level of income enjoy accelerated growth in the future.

Figure 1 illustrates this process. The chart shows GDP per capita on the x-axis and EXPY, a measure of how rich a country’s competitors are, on the y-axis. The EXPY measure, taken from Hausmann, Hwang, and Rodrik (2006), is a weighted average of the GDP per capita of other countries exporting the goods exported by each country. It is an indirect measure of how sophisticated (i.e., how much like a rich country) are a country’s products.

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Obviously, there is a positive relationship in this figure: rich countries export rich-country goods and poor countries export poor-country goods. But controlling for GDP per capita, Hausmann et al. (2006) found that those countries that manage to move into a relatively more rich-country export basket enjoy faster subsequent growth. In other words, for a given level on the x-axis, countries that are higher on the y-axis grow faster. For example, countries like China and Thailand would grow faster than countries like Honduras or Nicaragua.

Figure 1. EXPY vs. GDP per capita (logs), 2005



Source: Author's calculations using the United Nations Commodity Trade Statistics Database (UN Comtrade) and World Bank World Development Indicators (WDI).

Export Sophistication (EXPY)

The first step in calculating EXPY is to measure an average income level, or price, associated with each export good. This is PRODY, the income per capita of the exporters of that product weighted by the revealed comparative advantage of each country that exports the good:

$$PRODY_{i,t} = \sum_c \frac{(xval_{i,c,t} / X_c)}{\sum_j (xval_{i,c,t} / X_c)} Y_c$$

where $xval_{i,c,t}$ equals exports of good i by country c in year t , X_c equals total exports by country c , and Y_c equals GDP per capita of country c . This is a measure of the GDP per capita of the typical country that exports product i .

This product-level measure of sophistication is then used to measure the sophistication of a country's export basket as a whole. EXPY is simply the PRODY of each good (i) that country c exports, weighted by that good's share in the country's export basket (X). It represents the income level associated with a country's export package, or alternatively, the income per capita of a country's competitors.

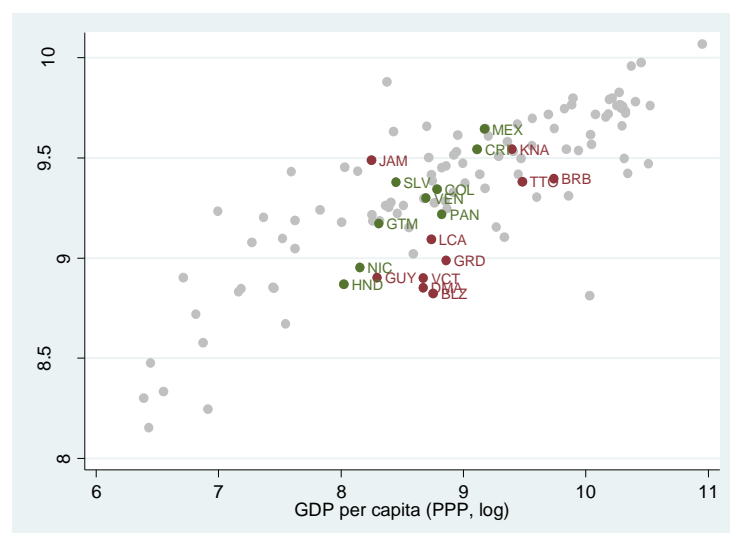
$$EXPY_{c,t} = \sum_i \left(\frac{xval_{c,i,t}}{X_{c,t}} \right) PRODY_{i,t}$$

Source: Hausmann, Hwang, and Rodrik (2006)

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We can therefore use this figure to evaluate how the CARICOM countries fare in terms of structural transformation. Have these countries managed to begin producing more sophisticated rich-country products that can fuel future growth? Figure 2 has the same information but we highlight the CARICOM countries and their Spanish-speaking neighbors for comparison.

Figure 2. EXPY vs. GDP per capita (logs), 2005



Note: Red are CARICOM countries and green are Spanish-speaking neighbors.
Source: Author's calculations using UN Comtrade and World Bank WDI.

This figure shows that the majority of the lower-income CARICOM countries export a relatively poor-country export basket for their level of income. Countries like Belize, Dominica, St. Vincent and the Grenadines, Grenada, and Guyana have among the poorest export baskets for countries with their level of development. The same goes for Trinidad and Tobago, which is typical of oil exporters, but also Barbados, and a low EXPY is not necessarily typical of countries specialized in tourism (discussed below). One exception seems to be Jamaica, whose EXPY is being pulled up by exports of beer (6% of exports with a PRODY of \$10,200) and chemicals (3.7% of exports with a PRODY of \$14,700). St. Kitts and Nevis is also slightly above average for its level of income. But for the most part, the CARICOM countries have not upgraded their structure of production as quickly as comparator countries.

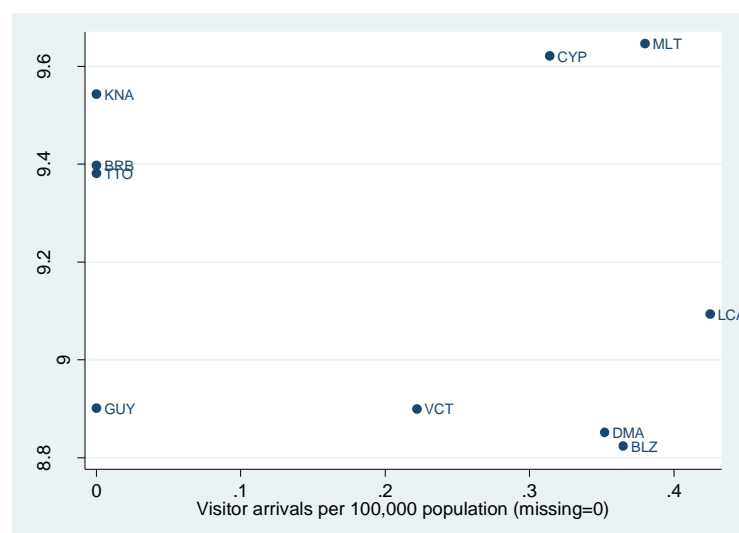
It is important to note that this result is *not* due to the fact that these countries have relatively small populations, and therefore would not be expected to export as sophisticated products as larger countries with similar levels of development. But one key caveat to these results is that they consider merchandise exports only, and do not include services like tourism and financial services. Unfortunately, these metrics of export sophistication require standardized disaggregated data by product. Such data is only available for merchandise exports, recorded for customs purposes. While there are data available for overall service exports as well as for different types of services at very high levels of aggregation, such data is not available at a sufficient level of disaggregation to perform this type of analysis.

Although we cannot incorporate tourism data into EXPY, we can compare the sophistication of the merchandise export basket of the CARICOM countries to other tourism specialists. Figure 3 shows the sophistication of the merchandise export basket on the y-axis and the

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intensity of tourism on the x-axis, with the proxy for tourism being the number of international arrivals per 100,000 people from the World Tourism Organization. The two additional non-CARICOM tourism exporters are Cyprus and Malta. What is interesting to note is that, although those two countries have comparable tourism activity (among those CARICOM countries for which we have arrivals data), they also have higher export sophistication in their merchandise export baskets. So at least taking these two comparators into account, the CARICOM countries are not suffering a lagging EXPY simply because they are concentrated in tourism.

Figure 3. EXPY versus Visitor Arrivals per 100,000 People



Note: Arrivals data and population data are from 2003, EXPY is for 2005.
Source: Author's calculations using UN Comtrade, World Bank WDI, and World Tourism Data.

Moreover, beyond this comparison, the finding in Figure 2 is itself important for any country in the region that cannot exclusively specialize in banking and tourism, and must diversify to other sectors: CARICOM countries are suffering lagging structural transformation. Furthermore, the lessons learned about the process of structural transformation from examining export data (below) and the subsequent policy discussion, apply to the services sector as well. It is therefore important to analyze why the CARICOM countries might be lagging in the process of structural transformation and, most importantly, what policies would help reverse this trend and accelerate transformation and growth in the region. This is the subject of this paper.

The Process of Structural Transformation

According to standard trade theory, structural transformation is a consequence of changing comparative advantage. In the Heckscher-Ohlin tradition, this is related to changing relative factor intensities caused by factor accumulation. As a country accumulates more physical and human capital, it naturally moves toward goods that are more intensive in physical and human capital. However, there are many reasons why structural transformation may be more complicated than this picture suggests. Hausmann and Klinger (2006 and 2007) and Hidalgo et al. (2007) investigate the determinants of the evolution of the level of sophistication of a country's exports and find that the process of structural transformation favors nearby products (those with similar inputs) in a highly heterogeneous product space (groups of export sectors). Countries differ greatly in the number of products they have nearby and this affects their capacity to move to new products.

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Structural transformation is based on the idea that every product involves highly specific inputs such as knowledge, physical assets, intermediate inputs, training, infrastructure, property rights, regulatory requirements, and other public goods. The inputs are specific in the sense that those required for one product are somewhat different than those required for another product. Established industries have sorted out the many potential failures involved in assuring the availability of all of these inputs, which can then be accessed by subsequent entrants into the industry. But firms that venture into new products will find it much harder to secure the requisite inputs. For example, they will not find workers with experience in the product in question or suppliers who regularly furnish that industry. Specific infrastructure needs such as cold storage transportation systems may be nonexistent, regulatory services such as product approval and phytosanitary permits may be underprovided, research and development capabilities related to that industry may not be there, and so on.

New firms therefore have to adapt those inputs that already exist in the economy for their new products, and there is evidence that these adapted inputs can be imperfect substitutes, with the degree of transferability depending on the business in question. For example, the particular set of infrastructure, institutions, and human capital specific to the garment industry are relatively easily adapted to the wiring harness industry (Klinger 2007) but more difficult to adapt to the call center industry.

This varying degree of substitutability implies that the probability that a country will be good at producing any particular new good is related to its installed capability in the production of other similar or nearby goods from which the currently existing productive capabilities can be easily adapted. The potential barriers preventing the emergence of new export activities are less binding for nearby products that only require slight adaptations of existing capacity, creating path dependence in the process of structural transformation.

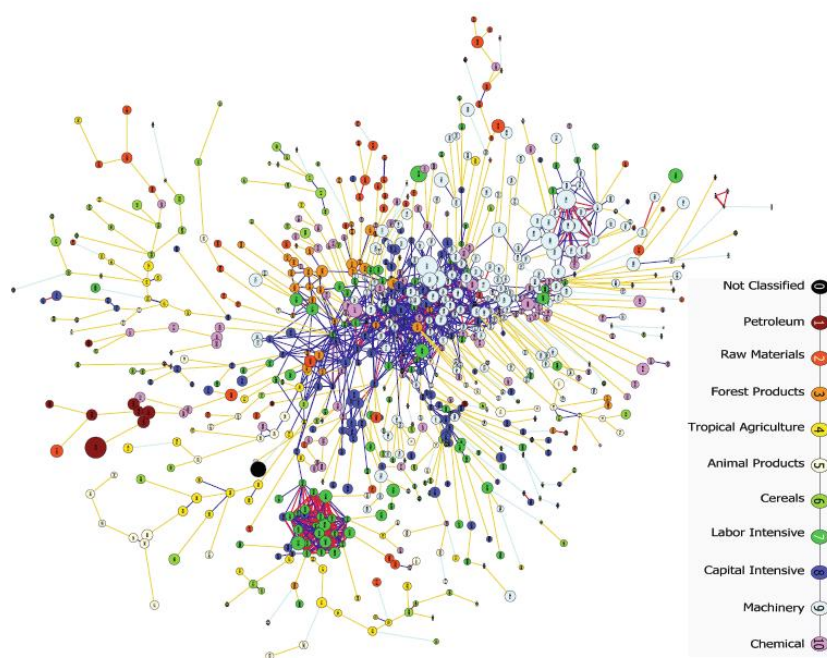
Path dependence is found by first developing an empirical measure of the revealed distance between products. We measure the distance between each pair of products based on the probability that countries in the world export both. If two goods need the same capabilities, this should show up in a higher probability of a country having a comparative advantage in both¹. This is calculated using disaggregated export data across a large sample of countries from the World Trade Flows data from Feenstra et al. (2005) and United Nations Commodity Trade Statistics Database (UN Comtrade).

These paired distances create a product space within which countries jump from one export sector to another. The distances reveal a highly heterogeneous space, which we can illustrate using the tools of network analysis (Hidalgo et al., 2007). Considering the linkages as measured in the 1998–2000 period, we first take the one strongest connection for each product that allows it to be connected to the entire product space. This creates the skeleton of the product space. The next step is to overlay this with the stronger links between products and color-code the linkages depending on their proximity. Figure 4 shows the visual representation of the product space. Each node is a product, its size determined by its share of world trade. In this graph, physical distances between products are meaningless: proximity is shown by color-coding the linkages between pairs of products. A light-blue link indicates a proximity of under 0.4, a beige link a proximity between 0.4 and 0.55, a dark-blue link a proximity between 0.55 and 0.65, and a red link a proximity greater than 0.65. Links below 0.55 are only shown if they make up the maximum spanning tree, and the products are color-coded based on their Leamer (1984) commodity group.

¹ Formally, the inverse measure of distance between goods i and j in year t , which we will call proximity, equals $\phi_{i,j,t} = \min\{P(x_{i,t} | x_{j,t}), P(x_{j,t} | x_{i,t})\}$ where for any country c $x_{i,c,t} = 1$ if $RCA_{i,c,t} > 1$ and 0 otherwise and where the conditional probability is calculated using all countries in year t .

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Figure 4. A Visual Representation of the Product Space



Source: Hidalgo et al., 2007

The figure shows that the product space is highly heterogeneous. There are peripheral products that are only weakly connected to other products, located on the outer edges of the space. There are some groupings among these peripheral goods, such as petroleum products (the large red nodes on the left side of the network), seafood products (below petroleum products), garments (the very dense cluster at the bottom of the network), and raw materials (the upper left to upper periphery). In addition to these peripheral clusters, there is a core of closely connected products in the center of the network, mainly of machinery and other capital-intensive goods.

This heterogeneous structure of the product space has important implications for structural transformation. If a country is producing goods in a dense part of the product space, then the process of structural transformation is much easier because the set of acquired capabilities can be easily redeployed to other nearby products. However, if a country is specialized in peripheral products, then this redeployment is more challenging because there is not a set of products that require similar capabilities. The process of structural transformation can be impeded due to a country's orientation in this space.

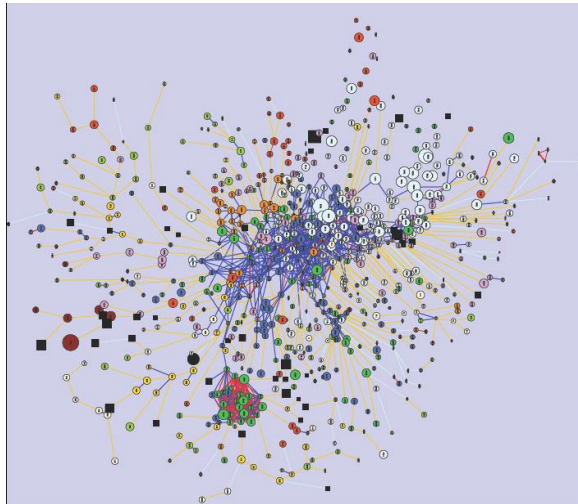
Figure 5 is a series of charts that show the location in the product space for a group of CARICOM countries, as well as some comparators, by placing a black square around every product in which it has significant exports² in the particular year.

² Taken to be when the RCA index (Relative Growth Rates of Merchandise Exports and Imports) is greater than or equal to one: when the country's world market share in that good is greater than its world market share in all exports, or put another way, when the good's share of the country's export basket is greater than the good's share in world exports.

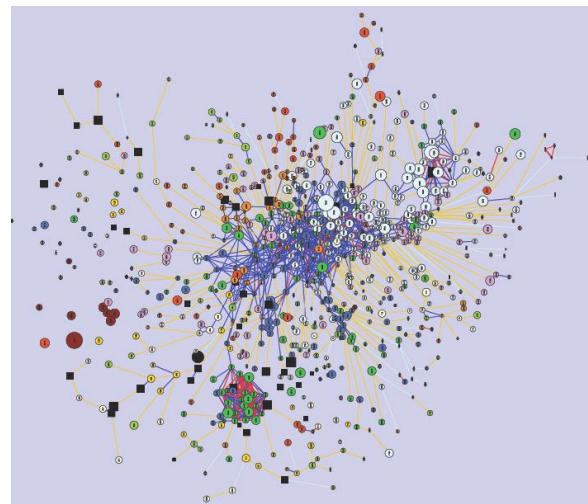
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Figure 5. Placing Countries in the Product Space (2000)

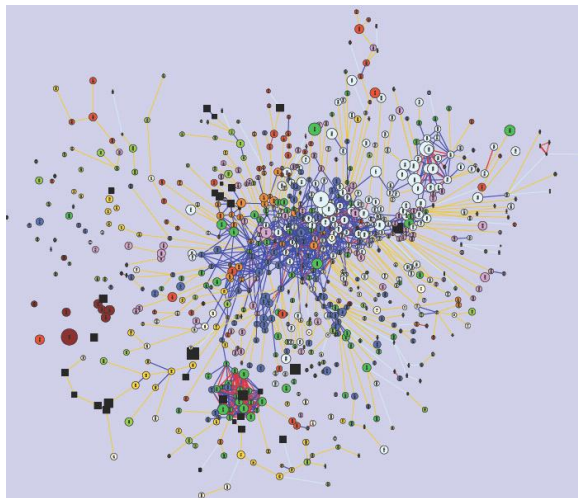
The Bahamas



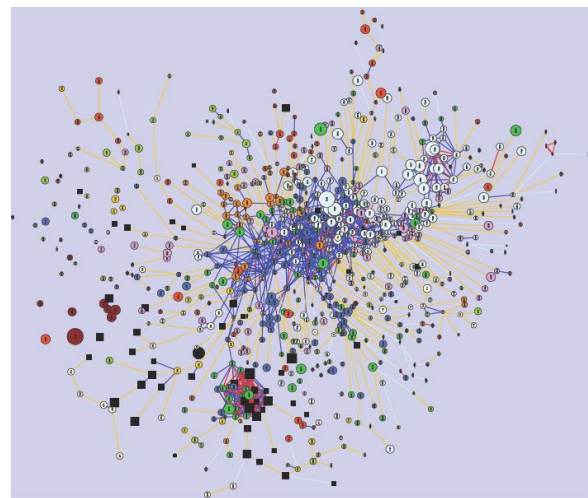
Belize



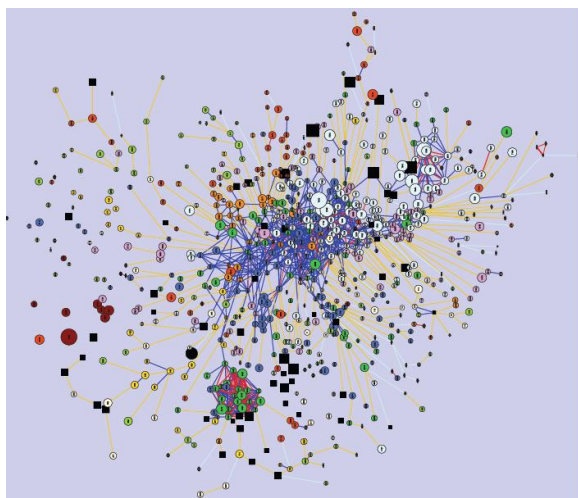
Guyana



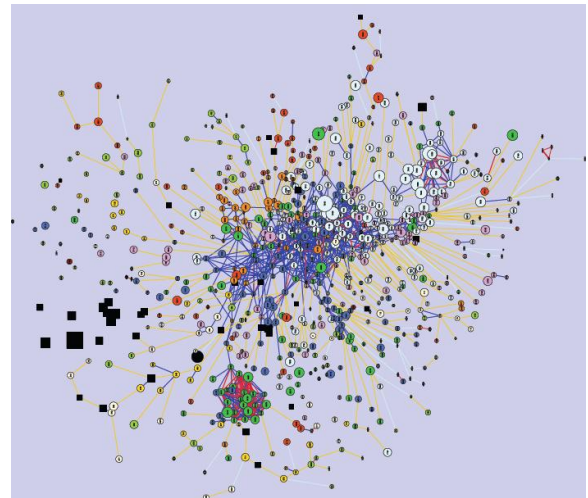
Jamaica



St. Kitts and Nevis

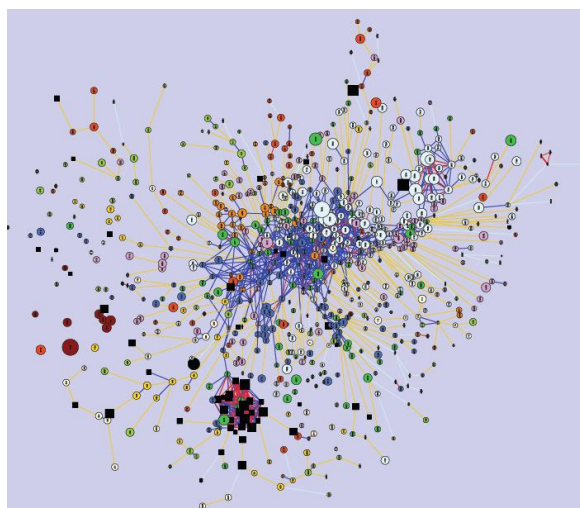


Trinidad and Tobago

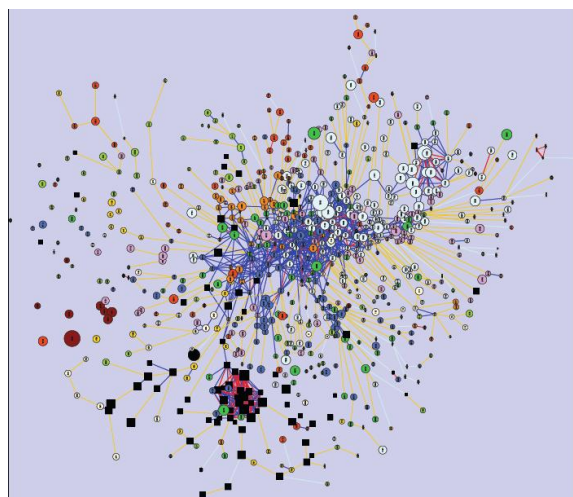


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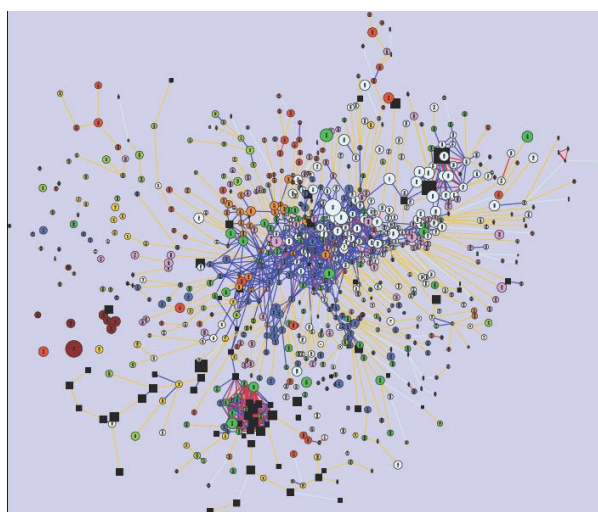
El Salvador



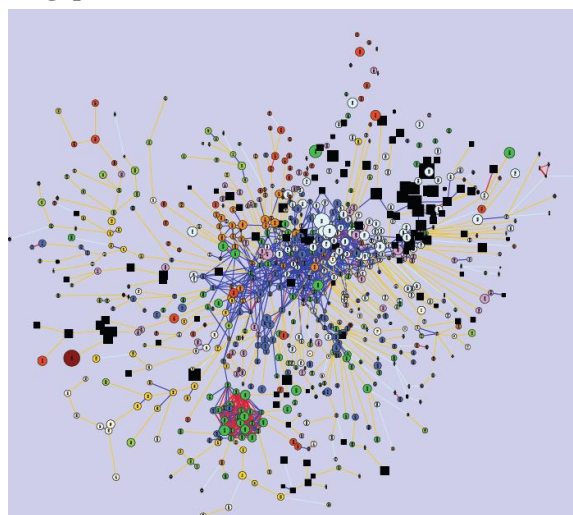
Guatemala



Costa Rica



Singapore



Source: Hidalgo et al., 2007

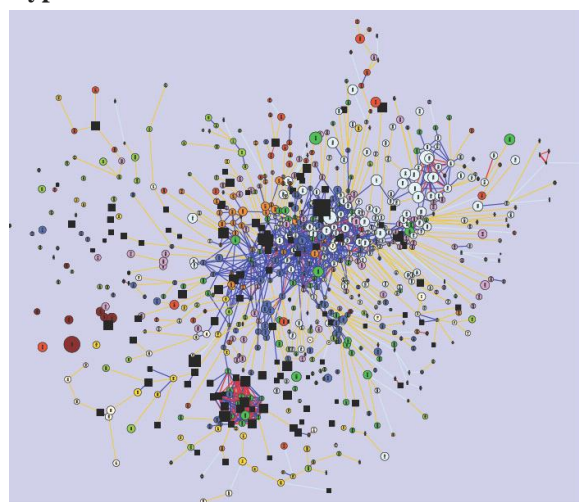
In general these figures show that the CARICOM countries are located in a highly peripheral part of the product space, but with some differences. On the one hand, countries like Belize have few peripheral export activities in agriculture and aquiculture, tropical fruit, and forestry. Guyana's products are also highly peripheral, with a concentration in raw materials and timber, but also some textile activities, and there are other textile activities not yet occupied by Guyana but nearby existing products. Jamaica, on the other hand, has completely occupied the peripheral agriculture and garment activities. It has no other activities that are nearby because it has already capitalized on all those products that require similar capabilities, and it is not clear where it can go next. Although Trinidad and Tobago has some other exports like food goods, these are swamped by the country's significant exports of hydrocarbons, which are highly profitable but also highly peripheral, meaning that the institutions, skills, and infrastructure they use do not have many alternative uses. Given the Bahamas' hyper-specialization in tourism and finance, it is difficult to draw many conclusions from their data, but that country does have some export activity in beverages as well as chemicals that are approaching the industrial core. Even more so is the case with St. Kitts and Nevis, which (at least in 2000) had somewhat well-connected exports in areas such as food and beverages, machinery, and electronics.

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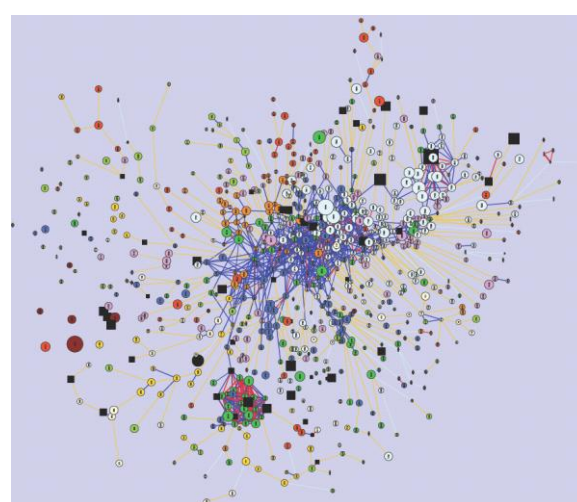
Compare this to CARICOM's neighbors. Although we observe a similar overall pattern of peripheral specialization in aquiculture and food products, as well as garments, greater connectivity of export activities is apparent than in the CARICOM countries. For example, Costa Rica is present in the electronics cluster and Guatemala has significant agricultural diversification, including processing. Looking outside of the region offers even starker differences. Singapore has moved beyond the peripheral natural resource and hydrocarbon sectors to also occupy the electronics cluster, industrial chemicals, and other machinery that is well connected to the industrial core of the product space. That country can then be expected to enjoy continued accelerated structural transformation because many alternative activities can use the inputs of its existing product set. We can also compare the CARICOM countries to the Mediterranean island nations that specialize in tourism.

Figure 6. Tourism Comparators in the Product Space (2000)

Cyprus



Malta



Source: Hidalgo et al., 2007

These figures confirm the findings above about the degree of structural transformation in the CARICOM countries compared to Cyprus and Malta. As with Jamaica, Guyana, and the Bahamas, both Malta and Cyprus are somewhat present in the peripheral agrifood and textile sectors. But in addition to those sectors, both countries have made greater inroads into the industrial core, with Malta moving into electronics manufacturing and machinery, and Cyprus becoming a significant exporter of machinery and other metal products, as well as some chemical products.

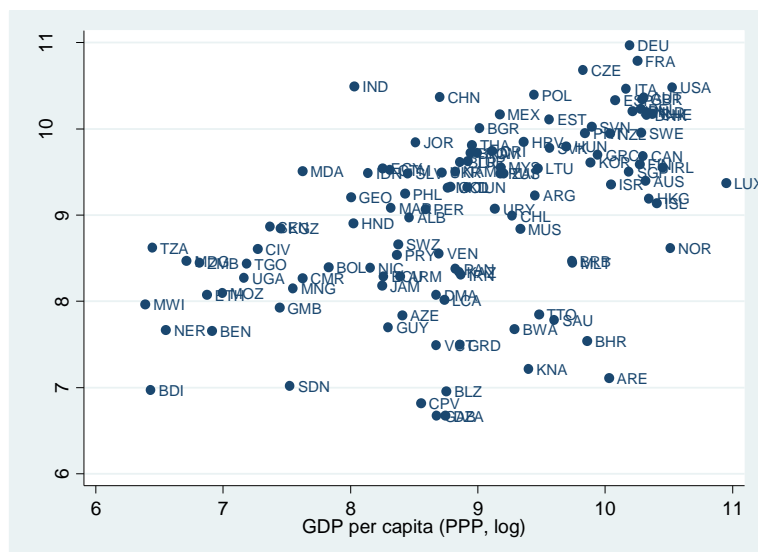
Further technical details on how these figures are constructed, as well as empirical results, can be found in the source documents cited above. But the key result for designing appropriate policies for accelerating structural transformation in those CARICOM countries where the process is lagging is that the range of sector-specific public goods and the level of co-ordination that new activities will require will be larger or smaller depending on whether or not there are many new activities nearby existing activities. Countries in a dense part of the product space will have many nearby activities that could be moved to with only minor adjustments to existing capabilities, whereas countries in a sparse part of the product space will have few new activities that use existing capabilities, and require a rather different policy orientation.

Therefore, before discussing appropriate policies for promoting structural transformation, we establish the degree of connectedness of the CARICOM countries in this product space: are

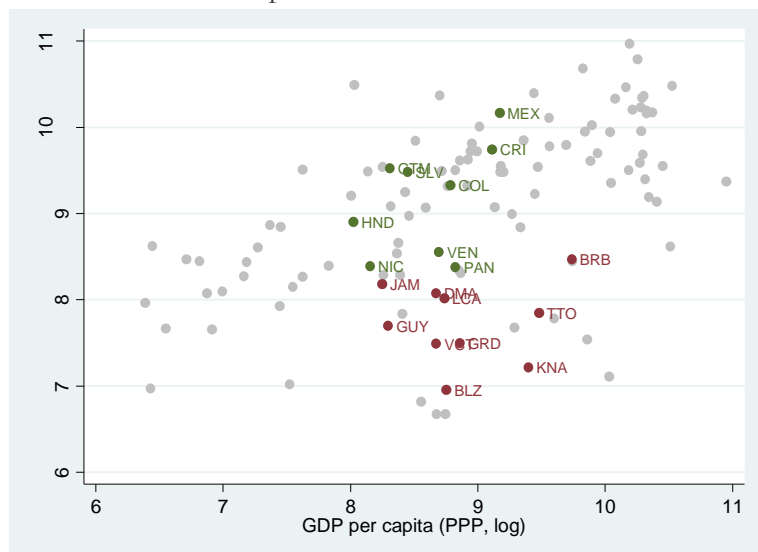
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these countries in a dense part of the product space with many nearby activities? In addition to the visual examination above, the original metric for evaluating this characteristic is “open forest” (Hausmann and Klinger, 2006). Another way to think of this metric is as the option value of the current productive structure in terms of new activities. Figure 7 shows open forest against GDP per capita, first for the entire world, followed by a close-up on the CARICOM countries and their comparators.

Figure 7. Open Forest vs. GDP per capita (logs), 2005



CARICOM and Comparators



Note: Red are CARICOM countries and green are Spanish-speaking neighbors.

Source: Author's calculations using UN Comtrade and World Bank WDI.

Open Forest

The degree of connectedness of a country's export basket is constructed in two steps. First, the distances defined above are used to calculate the density of the current export basket of a country around any good. This is the distance of good i from country c 's export basket at time t , calculated as the sum of all paths leading to the product in which the country is present, divided by the sum of all paths leading to the product. Density varies from 0 to 1, with higher values indicating that the country has achieved comparative advantage in many nearby products, and therefore should be more likely to export that good in the future.

$$density_{i,c,t} = \left(\frac{\sum_k \varphi_{i,k,t} x_{c,k,t}}{\sum_k \varphi_{i,k,t}} \right)$$

Hausmann and Klinger (2007) show that this measure of density is indeed highly significant in predicting how a country's productive structure will shift over time: countries are much more likely to move to products that have a higher density, meaning they are closer to their current production.

We then aggregate this measure of density, which is for a country around any single product, to an overall measure of the connectedness of a country's export basket. Open forest is basically the sum of densities to all un-exported products weighted by their PRODY.

$$open_forest_{c,t} = \sum_i \sum_j \left[\frac{\varphi_{i,j,t}}{\sum_i \varphi_{i,j,t}} (1 - x_{c,j,t}) x_{c,i,t} PRODY_{j,t} \right]$$

Hausmann and Klinger (2006) show that open forest is highly significant in determining the future growth of export sophistication at the country level.

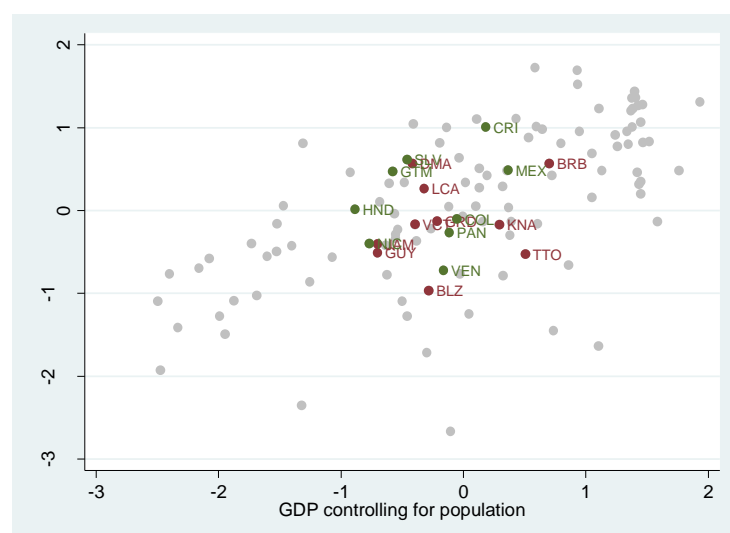
These figures suggest that the CARICOM countries are in an extremely sparse part of the product space. Even countries that are not outliers in terms of having highly unsophisticated current exports, most importantly Jamaica, are outliers in terms of having few nearby opportunities for structural transformation.

Again, however, we must consider population size. The CARICOM countries are for the most part microstates, which tend to have a low open forest. This is not necessarily a shortcoming of the data. Many models of structural transformation and the discovery of new export activities (e.g., Hausmann and Rodrik, 2003) are not neutral to population size. Larger countries will have more entrepreneurs trying out new economic activities, making the probability of succeeding in a particular new activity higher for larger countries. The benefit of success in even one new activity is also more significant since more imitators would be able to benefit from the spillover. Larger countries are also naturally more diversified and hence possess a broader set of inputs that can be redeployed into other uses. In terms of the model of Hausmann and Hidalgo (2009), the number of products a country makes is a positive function of the total number of capabilities it possesses. In both models, therefore, structural transformation is more difficult in smaller countries, all else equal. On this basis, metrics such as open forest would be expected to be on average lower for small states.

Figure 8 examines the degree to which population is affecting these results by examining open forest and controlling for population.

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Figure 8. Open Forest versus GDP per Capita (logs), 2005: Controlling for Population



Notes: x-axis is the residual of a regression of GDP per capita on population (both logs), y-axis is the residual of a regression of open forest on population (both logs). Source: Author's calculations using UN Comtrade and World Bank WDI.

Controlling for population improves the picture somewhat for the CARICOM countries in terms of the ease of moving to new products. But this adjustment would be an incorrect over-adjustment if it is the case, as most models suggest, that structural transformation is on average easier in larger countries.

We consider an alternative metric of connectivity in the product space, from Hausmann and Hidalgo (2009), who show that even without knowing what a country's capabilities are, it is possible to derive some important empirical implications from the matrix of countries and their exports. First, countries with more capabilities will be more diversified, because they would have more combinations of capabilities required by a wider range of products. Second, products requiring more capabilities will be made by fewer countries – they would be less ubiquitous – because fewer countries would have all the capabilities required for the product. Third, product requiring more capabilities will be made by more diversified countries, because the required capabilities are bound to be applicable to more alternative products.

Therefore a country's diversification—the number of products it exports (which Hausmann and Hidalgo [2009] label *k*)—is a measure of the number of capabilities a country has. However, some products require few capabilities while others require many capabilities, and if a product requires few capabilities, it will be ubiquitous. Moreover, other things equal, small countries would make fewer products (be less diversified) than bigger countries, just on the basis of their smaller size.

For these reasons, diversification is an *imperfect* measure of the number and sophistication of a country's capabilities and needs to be corrected with measures of product sophistication.

In a recent paper, Hidalgo and Hausmann (2009) showed how to weave together information about the diversification of countries and the ubiquity of products by introducing a technique they call the Method of Reflections. This method systematically corrects for the imperfections in the measures of diversification and ubiquity by iteratively mixing information from both of these dimensions. For instance, *k1* measures the average ubiquity of the products a country

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makes, with lower ubiquity indicating more complex goods, whereas k_2 measures the sophistication of a country's productive structure by considering information on the ubiquity of that country's products and on the diversification of the countries that make those same goods. These reflections can be repeated (k_3 , k_4 , k_5 , k_6) where each even number refers to a generalized measure of diversification, while the odd numbers refer to measures of ubiquity. The paper shows that these measures become increasingly correlated with GDP per capita and that the error term in that relationship is predictive of future growth. Moreover, the paper also establishes that with each reflection, the measures of diversification no longer depend on population and give an intensive or “per capita” metric of the range of capabilities a country has at its disposal.

This therefore provides an alternative metric of the degree of a country's centrality in the product space that is insensitive to population. Figure 9 shows the third reflection (k_6) against GDP per capita, first for the world as a whole followed by a close-up of the CARICOM countries and their neighbors.

Method of Reflections

The Method of Reflections characterizes countries and products by introducing a family of variables that capture the structure of the network defined by a M_{cp} matrix, which is equal to 1 if country c exports product p with an RCA above a given threshold and 0 otherwise. Because of the symmetry of the bipartite network, we refer to this technique as the Method of Reflections since the method produces a symmetric set of variables for the two types of nodes in the network (countries and products).

The method consists of iteratively calculating the average value of the previous-level properties of a node's neighbors and is defined as the set of observables:

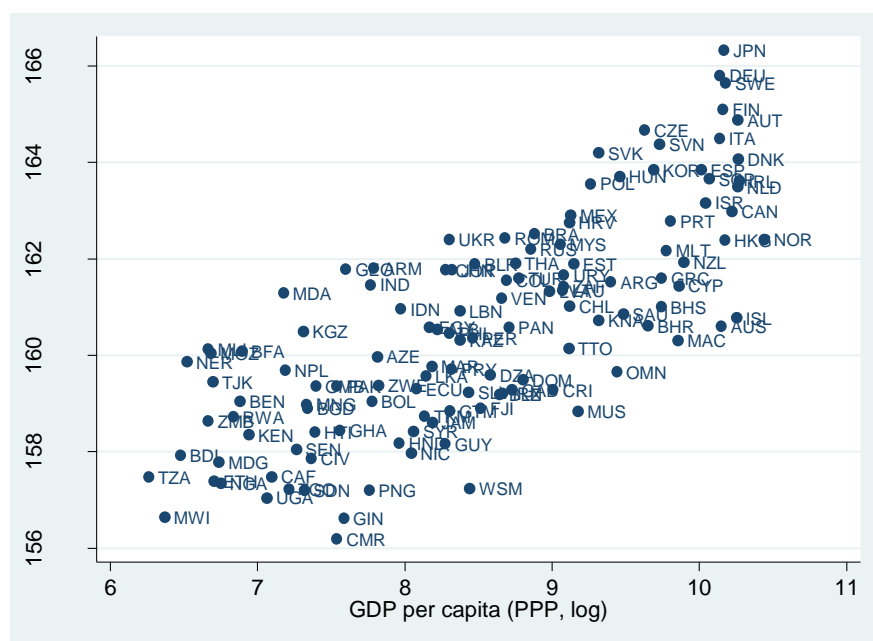
$$k_{c,N} = \frac{1}{k_{c,0}} \sum_p M_{cp} k_{p,N-1}, k_{p,N} = \frac{1}{k_{p,0}} \sum_c M_{cp} k_{c,N-1}.$$

for $N \geq 1$. In network terms, $k_{c,1}$ and $k_{p,1}$ are known as the average nearest neighbor degree [¹¹]. Higher reflections of the method, however, are interpreted as a decomposition of a node's properties as a linear combination of the properties of all the nodes in the network.

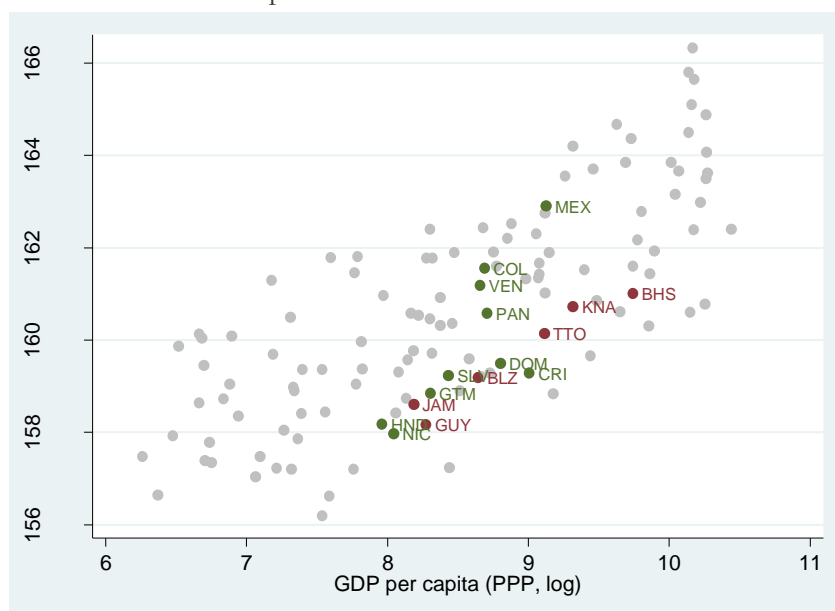
Source: Hausmann and Hidalgo, 2009

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Figure 9. k6 vs. GDP per capita (logs), 2000



CARICOM and Comparators



Note: Red are CARICOM countries and green are Spanish-speaking neighbors.
Source: Hausmann and Hidalgo, 2009

These results are similar to the results using open forest: the CARICOM countries are in a relatively sparse, unconnected part of the product space. Each country is among the lowest for its income category, despite the fact that this metric is not related to population (Hausmann and Hidalgo, 2009).

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Regional Integration

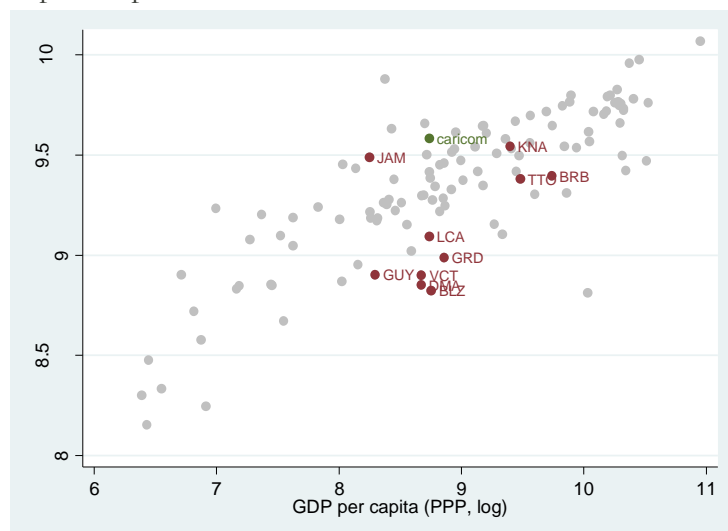
One very important issue among the CARICOM countries is regional integration. In 2006, the majority of CARICOM countries joined the CARICOM Single Market, which will liberalize mobility of capital, workers, and firms within the group. Even greater integration is planned for the longer term, including harmonization of tax systems and a monetary union.

How might this integration affect the country's relative export sophistication and their opportunities for future structural transformation? We can consider this question by performing the following experiment. Suppose there was perfect integration: what would the metrics above look like? To do this, we take all exports by CARICOM countries to other CARICOM countries and remove them as domestic trade. We then sum all external trade for each country by product line, thereby considering the block as a single integrated country, and re-calculate export sophistication and connectedness for the block. This gives a picture of what the metrics' value would be if CARICOM were indeed fully integrated, as shown in Figure 10.

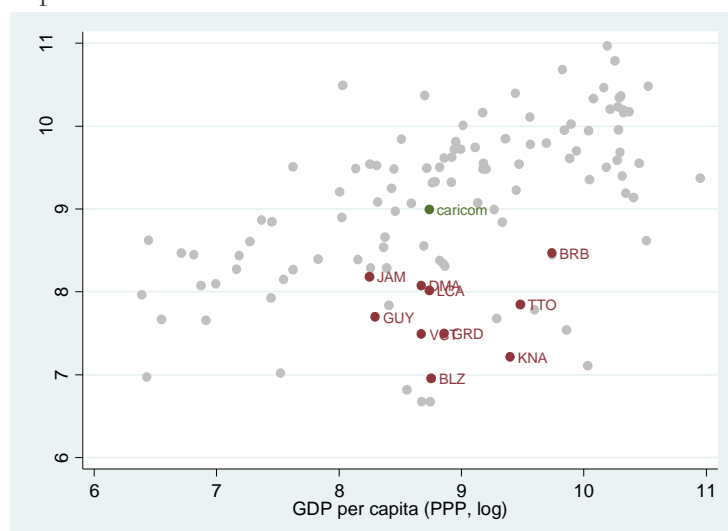
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Figure 10. Export Sophistication and Connectedness of CARICOM, 2005

Export Sophistication



Export Connectedness



Notes: GDP per capita for CARICOM is taken as the median value for those countries with GDP data included in the dataset: Belize, Barbados, Dominica, Grenada, Guyana, Jamaica, St. Kitts and Nevis, St. Lucia, Trinidad and Tobago, and St. Vincent and the Grenadines. Source: Author's calculations using UN Comtrade and World Bank WDI.

The results are quite striking: if CARICOM were a single, fully integrated country, its export sophistication would be considered high. And note that here we assigned the simple median GDP per capita across all CARICOM countries. If it were population-weighted, then Jamaica would be given a much larger weight, CARICOM would be even further to the left on the x-axis, and therefore even higher given its level of development. The difference in export connectedness is also striking. Although future opportunities for structural transformation facing the Caribbean countries as an integrated block are more or less average for the level of development, they are significantly better than when considering each country individually.

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It is important to note that the result is not merely an averaging of the individual members' level of sophistication and connectedness. For most sophistication and opportunities for future structural transformation, *the levels for the block as a whole are higher than for any individual member country.*

Note that this is simply a thought experiment, which assumes that if there were full integration, production patterns and exchange between countries would be exactly the same as it is now, which would very likely not be the case. Yet it is evidence that strongly suggests that regional integration would be valuable in terms of igniting future structural transformation.

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Productive activities require different types of inputs. Some are provided by the market and others are provided by the government. Among the latter, some are public goods in the sense that they are not rivalries and cannot be excluded, such as property rights, regulation, security, and certification rules. Others do not have those characteristics but have been taken over to a large extent by governments because of other forms of market failures. These include elements such as infrastructure, education, labor training, and certification services. The sector specificity of these public inputs is reflected in the fact that countries have literally hundreds of thousands of pages of economically relevant legislation and hundreds of government agencies. And, most importantly, each one of these pages of legislation and each public agency has a differential effect on various economic activities.

The high number of public inputs is not unlike the plethora of privately provided inputs. However, markets have three elements that facilitate coordinating the provision of private inputs with their demand. First, markets have prices that provide information about willingness to pay and relative costs. Second, products are provided by profit-motivated firms that respond to the price information. Third, capital markets mobilize resources to firms that are expected to generate profits. Hence, coordination can take place in a decentralized manner because the market as a self-organizing process involves a system of information, incentives, and resource mobilization. It was this invisible hand that Adam Smith tried to exemplify in his examples, pointing to the large number of individual activities and inputs that go into making a coat or a pencil. And yet, markets may fail for a myriad of reasons that may require public action.

In stark contrast with private inputs, public inputs suffer from the fact that most of them have no price, so there is no decentralized mechanism to reveal information. Moreover, there is no clear incentive for governments to respond to the information because the profit motive is not a relevant or powerful incentive for public policy. Finally, even if the information and incentive problems are addressed, the government does not have a decentralized mechanism to mobilize resources: these most frequently are mobilized through centralized and politicized budgetary processes.

This need for public inputs creates major challenges for public policy. First, how to assure the best possible provision of public inputs to existing activities given the information, incentives, and resource mobilization problems mentioned above. Second, how to identify the industries that could have existed with an alternative provision of public inputs but that do not exist precisely because of these missing inputs.

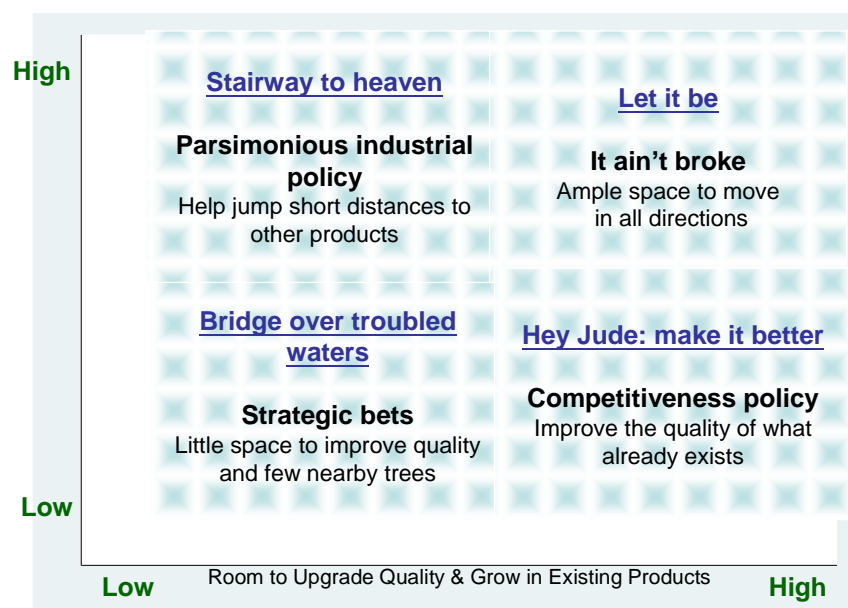
By definition, existing activities exist, and consequently it is possible to engage them in dialogue or interact with them through other means. Potential new activities do not exist yet and consequently require a different treatment. Moreover, the distance of those potential new activities has important implications for what this treatment should be.

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Fortunately, we can use the metrics motivated above to determine what policy situation each of the CARICOM countries is in. First, we can determine the relative importance of discovering new activities by looking at whether or not the current basket is sophisticated enough compared to GDP per capita to sustain growth. Second, we can determine the relative distance of such discoveries, should they be necessary. If the current export basket is in a central part of product space, resulting in a high open forest, then there is a clearer path towards new products. However, if the current export package is intensive in capabilities that are not easily redeployed to alternative products, then there is not an obvious path to other parts of the product space, and a large jump to a new part of the space is necessary. This is so, because the new activities require the coordination of the demand with the supply of many still nonexistent capabilities.

These two dimensions are summarized in Figure 11, which provides a framework for determining the appropriate policy orientation. The y-axis represents how easy it will be for the country to grow by moving to new products, and the x-axis represents how easy it will be for the country to grow within existing sectors. The appropriate policy stance for each quadrant of this space is presented in the matrix.

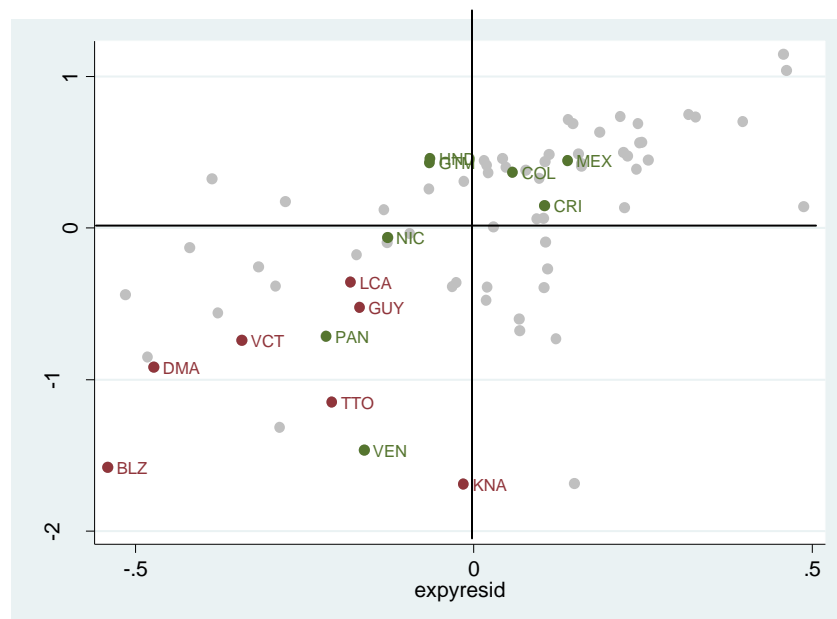
Figure 11. A Policy Map for Structural Transformation



This policy map helps assess the degree to which policies to promote structural transformation are needed, and what form those policies should take. Figures 12 and 13 show the policy with the CARICOM countries and their neighbors highlighted. Figure 12 uses open forest and Figure 13 uses reflected diversification because of the question of the effects of small population on the results.

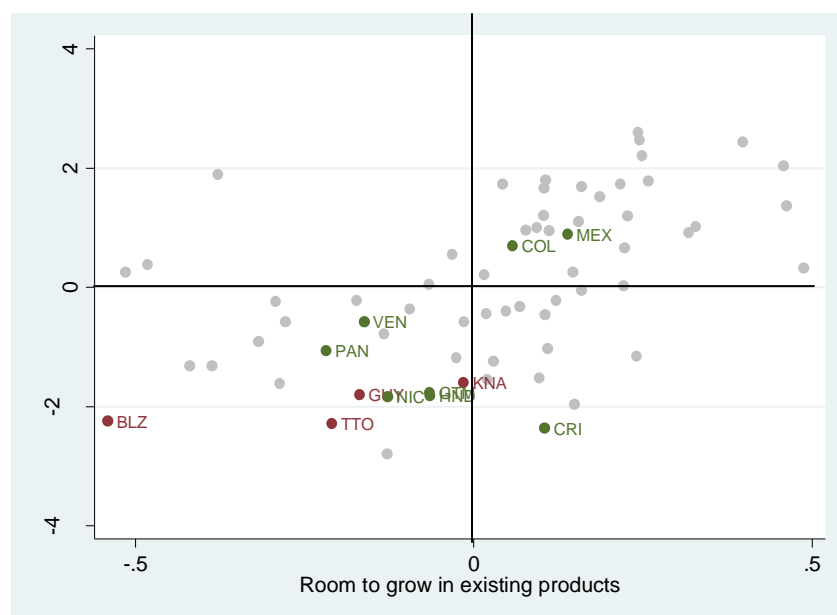
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Figure 12. Residual of Open Forest and EXPY on GDP per Capita



Notes: x-axis is the residual of a regression of EXPY (PPP) on GDP per capita (PPP) (all logs), y-axis is the residual of a regression of open forest on GDP per capita (all logs). Source: Author's calculations using UN Comtrade and World Bank WDI.

Figure 13. Residual of k6 and EXPY on GDP per capita



Notes: x-axis is the residual of a regression of EXPY (PPP) on GDP per capita (PPP) (all logs), y-axis is the residual of a regression of k6 on GDP per capita (log). Source: Author's calculations using UN Comtrade and World Bank WDI.

Both of these methodologies suggest that the CARICOM countries are, for the most part, in the lower left “strategic bets” quadrant: they have to move to new productive activities but have very

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few nearby. Saint Kitts and Nevis is approaching the lower-right “competitiveness” quadrant, and although there is insufficient data to place Jamaica on this plane, the previous results suggest that it would be in a similar location, approaching the lower-right quadrant. Yet the region as a whole is squarely in the lower left quadrant, concentrated in nonservice activities that will do little to stimulate future growth, and with few nearby activities to fuel structural transformation.

Again, we must highlight the fact that services are not included in this data. For many countries in the region, their concentration in financial services and tourism may mean that there are other service sectors that are nearby. Given that many lower-income countries are also successful service exporters, it is unlikely that this missing data is pulling down EXPY, but it might very well be pulling down open forest since the capabilities required to successfully export financial services and tourism could be useful for many other activities. This means that, at least for the services economy, some of the countries in the region could be higher on the y-axis than they appear, and a conservative financial approach to promoting structural transformation rather than a more strategic approach might be sufficient, and least for the services sector. As such, both the strategic and the parsimonious approach to promoting structural transformation will be discussed in turn.

One point deserves mention up front: the issue often referred to as “picking winners.” The idea is that the government should not be in the business of choosing some sectors over others and trying to outsmart the market as to where resources should get allocated. But since many obstacles and public inputs are sector-specific and since it is not feasible to identify all obstacles and supply all the public inputs required by all existing and potential activities, governments find themselves in the unenviable position of being “doomed to choose” (Hausmann and Rodrik, 2006). The question is what does it mean to choose? For some, it is to have an omniscient government select priority sectors to be protected and subsidized until they are competitive, which presumes that the government knows more than the market. Instead, the policies outlined below are aimed at learning about sector-specific barriers and providing the necessary sector-specific public inputs to allow firms to move to new activities or to operate existing activities more productively. In principle, all potentially profitable activities deserve an adequate provision of the complementary public inputs. But in practice, identifying these inputs, and agreeing on the way to supply them requires scarce public attention; legislative time; and, often, fiscal resources. Choices are de facto made because, contrary to an often implicit assumption, public inputs, such as infrastructure, institutions, and education, are not as horizontal as suggested in most models, and are instead quite sector-specific. Upgrading the urban road network versus expanding rural roads will have important implications for some sectors over others. Building a cold storage transport chain or creating property rights on the spectrum are other examples of this specificity.

Providing appropriate public inputs requires a government that can identify as many obstacles and opportunities as possible and that can make choices in the wisest and most informed manner. The analysis and policy guidelines outlined below are to be seen as a contribution in that direction.

Promoting Transformation: What Strategies?

Figure 11 above showed three strategies to promote structural transformation. The bottom right-hand side of the matrix represents existing activities that can be enhanced to push the country into much higher levels of income. Such a change requires competitiveness policies: strategies to do more of and better the things that the country is already doing. This strategy involves solving coordination problems within the clusters or, in other words, between the relevant related activities. This involves a dialogue between existing businesses and with the government.

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The upper left-hand corner of Figure 11 represents the challenge to move toward relatively nearby activities. These are activities that either do not yet exist or only on a very small scale but where many of the requisite inputs are already in place. In this situation, entrepreneurs should be encouraged to venture into these new spaces and should be supported in sorting out the coordination failures caused by the missing public and private inputs. These pioneer activities may generate significant spillovers because they reveal information about opportunities and obstacles that are socially valuable. Hence, there is a case for special attention, as argued in Hausmann and Rodrik (2003).

The lower left-hand corner of Figure 11 represents the strategic bets. These are activities that cannot happen without major public involvement because on its own the market is unlikely to solve the coordination problems. Examples of strategic bets are biofuels in Brazil and Colombia, call centers and other forms of business-process outsourcing in many countries, export-processing zones with bilateral trade agreements in Central America, the attraction of Intel to Costa Rica, the Biopolis in Singapore (bioengineering and biomedicine), and new tourism destinations. These activities require many large inputs to be available that cannot be provided or coordinated by the market. Making the Maya Route into a major tourism destination requires conservation and archeological activities, roads, airports, infrastructure, advertising, and many more highly specific inputs. Biofuels require domestic standards for gasoline and international standards for ethanol and roads to expand access from agricultural lands to sugar refineries or other processing plants. Development of an oil and gas capital equipment industry in South Africa requires the building of a new port, space in an existing port, significant coordination between small private suppliers, and a major labor training effort. These things do not happen without major government involvement.

In all of these activities, the quality, depth, and bandwidth of the public–private dialogue is key. We discuss some policy guidelines for both facilitating nearby jumps (parsimonious) and more distant jumps (strategic bets), and then give some specific initiatives as examples.

Institutional Setup for Learning and Facilitating Nearby Jumps

As argued, the CARICOM countries need a way to dialogue with the private sector to learn the sector-specific inputs that are missing. Certainly a public–private dialogue already exists to some extent, but this dialogue has to identify barriers at a much higher level of specificity than is often the case. Meetings with representatives of the private sector collectively will not get this job done because at this high level of aggregation, the particular needs of each individual sector will be lost. Only the lowest common denominator across industries or those concerns of the largest existing industries will rise to the surface. For example, while an overall tax reduction may be mentioned, the telecom upgrading needed by the call center industry and the IP regulatory reform needed by the pharmaceutical industry will be lost in aggregation since these sectors may be small or nonexistent. To identify sector-specific constraints, the dialogue must occur at a much more disaggregated level, and therefore have the necessary bandwidth to deal with that complexity (Hausmann, 2008).

Organizing such a private–public dialogue is difficult because there are many different business interests in the region with differing levels of visibility and voice, as well as limited government time and attention. To some extent, data can be used to systematically scan a country's opportunity space and identify promising activities to be prioritized and investigated more thoroughly. The appendix illustrates this process with a data-driven scan of the opportunity set for two the CARICOM countries: Belize and Jamaica.

This data is one potential starting point, but it leaves out important service activities. Moreover, each country's productive structure is changing over time. Therefore, this dialogue should

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be able to bring in new sectors of the economy as new opportunities for structural transformation emerge. Hausmann, Rodrik, and Sabel (2008) offer some specific policy proposals to achieve such a dialogue and overcome the three problems mentioned above: information, incentives, and resource mobilization. Their particular policy suggestions must be examined to determine appropriateness for the particular countries in the region; however, we can identify some general design principles for these or any other policy initiatives to promote public–private dialogue that can identify and act on sector-specific constraints and opportunities. The guidelines proposed by Hausmann and Rodrik (2006) and Hausmann, Rodrik, and Sabel (2008) are as follows:

- Let the private sector self-organize and coalesce around common requirements rather than placing them in pre-determined buckets, and allow new interests to engage the public sector rather than limiting it to those identified as high-potential at some given date. The lists above can help prioritize discussions and help decide on the allocation of scarce resources, but they should not be taken as a final determination on where to focus efforts.
- The process should be transparent. This dialogue, particularly the requests from the private sector, should be public in order to limit rent-seeking and increase the legitimacy of this endeavor from the perspective of the rest of society, thus making sure that policy goals are in the public interest.
- Interventions should be focused on identifying and providing public inputs that increase a sector's productivity, thus allowing it to be developed or to expand. The effect of interventions should be to increase productivity and hence the amount of value that is created. By contrast, there are many ways to increase *profitability* without greater productivity, which essentially implies redistribution. For example, allowing firms to sell more dearly (e.g., through protection), forcing suppliers to sell more cheaply, or granting subsidies may make the activity more profitable but at the expense of suppliers, customers, or taxpayers.
- The private sector should be willing to invest its own funds in the solution so that the request passes a market test. Co-financing is a good signal that there is real demand for the requisite input.
- Interventions should have clear criteria for success (to identify losers), accountability (to let losers go as early as possible), and sunset clauses (to ensure no financial commitments are open-ended).

These guidelines should help minimize the chances that a parsimonious industrial strategy will fall victim to corruption, inefficiency, government failure, and private capture. There are always risks, but the alternatives of either wishing away sector-specificity or pre-selecting both sectors and specific inputs without private sector involvement will only prolong the region's lack of structural transformation.

Institutional Setup for Strategic Bets

While creating this high-bandwidth public–private dialogue will help overcome barriers to the emergence of nearby activities (as well as growth in existing sectors), the results above suggest it will not be enough for most of the CARICOM countries since they require longer jumps to new areas of the product space. But moving to more distant export activities is difficult, and these long jumps do not occur with much regularity. While nearby activities require the same or similar capabilities to those already existing in the country, distant export activities have capability requirements that are very

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different. Firms that wish to jump to these new activities will face many missing capabilities, and the wider range of these capabilities would have to appear simultaneously to make such jumps feasible.

In addition, it may not be as easy to learn what particular capabilities are missing. With nearby sectors, there are already firms in similar activities present in the economy. For many of the nearby sectors, there are already small amounts of exports in the country, and there is most likely production for the domestic market. This means that there are existing firms in the country that can be engaged to learn what is missing. They are the counterparts for the dialogue discussed above. But for very distant activities, it is not as easy to find a counterpart, and more of a process of search, promotion (including actively seeking foreign direct investment), and evaluation is necessary. Again, the product space data can be used as a guide (see Appendix for its application to Jamaica and Belize), but this is just a starting-point.

For some industries dominated by large international firms (for example, electronics manufacturers in the Belize case), this can be learned by engaging those international firms directly, encouraging them to invest in the country, and having them identify the problems that would limit their productivity. There could also be domestic firms in related industries whose problems may be indicative of those of the industries further afield. Learning about the particular constraints to entering further-away sectors and the cost/benefit analysis of the required investments could be subcontracted to management consulting firms.

Some general policy proposals to facilitate the search for distant opportunities and larger leaps in the product space are also provided in Hausmann, Rodrik, and Sabel (2008). The authors suggest either a venture fund or a refocusing of development banks on facilitating longer jumps. Such a body would have an open window that encourages investors to come with business plans for such activities and should identify what aspects of the business environment are problematic or missing for the industry to be viable. Financial support is granted in part to encourage the private sector to develop such plans and to reveal this publicly valuable information to the venture fund. The venture fund should act as an information revelation mechanism for the space of opportunities and the obstacles and should prepare policy solutions for the obstacles identified. The fund should be evaluated not in terms of the amount of money it lends, but instead on the amount of investment it triggers by helping to fix the provision of public inputs, even if these investments are financed privately. Being owned at least partially by the government, and embedded in the government, should facilitate the implementation of the policy proposals that emerge from this process. The idea is not to find solutions that are specific to the investor, but instead, to design solutions that would be of use to any other firm or individual with a problem of that kind. This way, the business environment is improved for all other incumbents and for potential entrants to this activity and others.

Another way to facilitate the search for new activities is to build a new industrial zone with a management team. The zone would solve some easy to identify constraints such as power, water supply, transportation infrastructure for goods and workers, and access to regulatory and certification services. Beyond this, the management team would have to promote the use of the industrial zone by attracting new investors. Each investor would have specific concerns about operating in the country given the missing public and private inputs and capabilities. The management team would have to have the capacity to analyze these missing inputs, explore ways to circumvent them, and inform government of problems, solutions, and costs in order to assess whether addressing these problems is warranted in light of the potential new investments that it would bring in.

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Here again, the idea is that the industrial zone, in the same way as the venture fund, is really in the business of exploring opportunities and obstacles and identifying solutions that would trigger new activities. Being embedded in the government would help in implementing solutions. Every opportunity must be taken to design solutions that are as general as possible to have the widest possible effect on new activities, beyond that of the investor who helped identify the obstacle.

These institutions are designed in this open-architecture search mode to avoid the well-known failures in directed industrial policies of the past that created white elephants rather than structural transformation. To this end, the guidelines in the previous section equally apply to such institutions, particularly the focus on productivity-enhancing investments and providing sector-specific public goods rather than subsidizing low productivity.

Examples of Interventions to Support this Process

There are important interventions that national governments, regional bodies, and external organizations could pursue to help CARICOM countries implement the policies described above, including supporting institutionalization of the dialogue process, creating the institutions designed to search the longer strategic jumps through a venture fund, setting up industrial zones, and providing technical assistance.

- **Supporting the public–private dialogue process.** The IDB could provide a loan to support the creation of deliberation councils and funding for studies to support the technical work of the councils. The studies would help identify ways in which productivity could be increased through adequate provision of public inputs (research and development, legal framework, regulatory issues, infrastructure, education, and labor training). Such an initiative should include resources to fund the budgetary costs of the solutions that this process will identify, and the rules of use should provide assurances that such solutions are consistent with the public interest. Moreover, the existence of resources to be allocated to the solutions creates incentives to the private sector to participate in the deliberation councils rather than free-ride on the efforts of others. It should also provide incentives to the political process to fund such solutions. Such a council could be set up for the region as a whole, but the cross-country allocation of resources to provide the requisite inputs would be contentious, and the relevant decision-making authority for these public inputs should rest at the national level.
- **Creating a venture fund designed to promote new activities or processes.** The fund would be used to co-finance projects that involve new products or processes. The fund should develop the capacity to identify missing capabilities and public inputs that make these new activities risky or difficult. One of its main functions should be to inform the government about obstacles and to propose solutions. The design of the governance structure of the fund must ensure that management targets performance indicators that adequately measure informational and transformational objectives. This means that conventional metrics, such as the amount of money invested, are inadequate. The proper measures should relate to the amount of investment that was encouraged thanks to the elimination of the identified constraints, whether these investments are carried out by the initial investor or by others that benefit from the reform and whether they are financed by the fund or through other means.
- **Creating industrial zones with management teams.** The industrial zones would require adequate infrastructure as well as management teams that are focused on

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identifying and promoting new activities and finding solutions that improve the business environment by improving the provision of public inputs. This goes beyond the traditional export-processing zone that provides nonspecific manufacturing infrastructure and relaxed customs and taxation rules. The focus of these zones would be to search for new activities that may have complex requirements. Additional resources should be provided beyond the construction of the industrial zones to address the obstacles identified through the above-mentioned initiatives.

These are some examples potential policy initiatives, which would have to be refined based on political and budgetary constraints. Moreover, these or any other efforts to stimulate structural transformation should take into account the design guidelines outlined above in order to avoid the well-known failures of industrial policies of the past. Yet it is clear from the results that some action is necessary in order to ignite structural transformation and economic growth in the Caribbean.

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Appendix. Using Data to Identify Promising New Activities: Belize and Jamaica

The various figures presented in this report show that Belize is one of the worst performing countries in the region in terms of the sophistication of its current set of export activities and the proximity of new activities. Belize is specialized in a highly unsophisticated export basket, with few nearby export activities on the horizon. Jamaica showed a higher value of EXPY, but the map of the product space revealed that Jamaica was specialized in the periphery of the product space, and moreover, had already occupied many of the sectors in its area of the periphery, with only limited room to move to related textiles and fisheries products. This was confirmed by Jamaica's extremely low level of both open forest and reflected diversification (k6).

Therefore, for both Belize and Jamaica, ensuring that nearby opportunities are capitalized on is important, but it may be necessary for more proactive strategic exploration of new areas of the product space. The data used above to evaluate Jamaica's and Belize's history of and future opportunities for structural transformation can also help guide such a search.

First, we focus on nearby activities. Nearby is defined in terms of density of existing activities around a certain product (Hausmann and Klinger, 2007). Density is calculated for each potential activity as the distance-weighted number of existing activities around it. This variable is a highly significant predictor of the likelihood that a country will develop comparative advantage in a particular product over time. Below we list each country's low-hanging fruit: those activities with the highest density for Belize but that are not yet a significant exporter in³.

³ Calculated as product RCA reaching 1 for each activity, i.e. for the products to have the same share in the country's exports as they do in world exports. Note that for Belize this is 2005 data, but for Jamaica it is 2004 data.

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Table 1. Belize: Low-Hanging Fruit, 2005

Product Code	Product Name	Exports (US M)	World Market (US B)	PRODY (PPP)	Density
1801	Cocoa beans, whole or broken, raw o	0.03	1.03	2243	0.058
1207	Other oil seeds and oleaginous frui	0.07	1.14	3030	0.054
304	Fish fillets and other fish meat, f	0.60	10.96	13627	0.054
4407	Wood sawn or chipped lengthwise, sl	1.00	29.29	13218	0.049
305	Fish, salted, dried...; smoked fish; fi	0.00	3.41	21799	0.048
714	Roots and tubers with high starch c	0.00	0.65	6124	0.048
1704	Sugar confectionery (incl. white ch	0.14	6.07	10513	0.048
3401	Soap; organic surface-active produc	0.00	3.95	5570	0.047
804	Dates, figs, pineapples...etc, fres	0.00	3.05	6692	0.046
302	Fish, fresh or chilled (excl. those	0.00	8.11	12231	0.046
709	Other vegetables, fresh or chilled	0.12	7.00	10274	0.046
2302	Brans, sharps and other residues, d	0.02	0.51	6508	0.046
1604	Prepared or preserved fish; caviar	0.00	7.91	8581	0.045
904	Pepper of the genus Piper, Capiscum	0.00	0.93	5924	0.045
508	Coral; shells of molluscs, crustace	0.12	0.09	11269	0.045
6305	Sacks and bags, used for packing go	0.00	2.02	7260	0.045
2301	Flours, etc, of meat, fish, etc, un		2.94	15027	0.045
106	Other live animals, nes	0.00	0.54	9384	0.044
1511	Palm oil and its fractions		9.27	5323	0.044
901	Coffee; coffee husks and skins; cof	0.00	10.57	2814	0.044
1101	Wheat or meslin flour	0.00	2.02	5652	0.043
307	Molluscs & aquatic invertebrates, ne	0.00	5.49	7883	0.043
402	Milk and cream, concentrated or swe	0.00	10.40	13162	0.043
711	Vegetables provisionally preserved,	0.04	0.44	3106	0.042
4409	Wood, continuously shaped along any	0.18	4.37	12601	0.042

Source: Author's calculations. Product code is HS 1992 4-digit code.

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Table 2. Jamaica: Low-Hanging Fruit, 2004

Product Code	Product Name	Exports (US M)	World Market (US B)	PRODY (PPP)	Density
709	Other vegetables, fresh or chilled	1.09	6.86	9162	0.093
302	Fish, fresh or chilled (excl. those	0.77	7.15	12018	0.091
713	Dried leguminous vegetables, shelle	0.00	2.73	3721	0.091
1511	Palm oil and its fractions	0.00	9.52	4867	0.088
3401	Soap; organic surface-active produc	0.24	3.81	5205	0.088
801	Coconuts, Brazil nuts and cashew nu	0.03	1.35	1841	0.087
304	Fish fillets and other fish meat, f	0.14	9.53	13442	0.086
303	Fish, frozen, (excl. those of 03.04	0.06	9.88	11100	0.086
1703	Molasses resulting from the extract	0.01	0.41	5309	0.086
1207	Other oil seeds and oleaginous frui	0.00	1.21	2568	0.086
2401	Unmanufactured tobacco; tobacco ref	0.00	6.15	2340	0.083
305	Fish, salted, dried...; smoked fish; fi	0.04	3.26	22006	0.083
6305	Sacks and bags, used for packing go	0.00	1.80	5092	0.082
2402	Cigars, cigarillos, cigarettes, etc	0.62	14.10	9846	0.081
1513	Coconut (copra), palm kernel or bab	0.00	2.12	4985	0.081
4820	Registers, account books, etc; albu	0.22	3.14	8941	0.081
2309	Preparations of a kind used in anim	1.00	10.60	12543	0.080
402	Milk and cream, concentrated or swe	1.30	10.10	14285	0.079
3105	Mineral or chemical fertilizers, ne	0.06	5.64	8212	0.079
1517	Margarine; edible preparations of a	0.03	2.41	6847	0.079
407	Birds' eggs, in shell, fresh, prese	0.03	1.42	9421	0.078
4819	Cartons, boxes, etc; box files, etc	0.13	12.30	9449	0.078
1212	Seaweeds, algae, sugar beet and can	0.08	0.85	6373	0.077
6207	Men's or boys' underpants, briefs,	0.05	1.15	6373	0.077
1103	Cereal groats, meal and pellets	0.02	0.47	10920	0.077

Source: Author's calculations. Product code is HS 1992 4-digit code.

The low-hanging fruit in Belize is almost exclusively in agriculture: nontraditional agriculture, forest products, processed foods, and mariculture. The fact that these sectors are relatively nearby suggests that their productive requirements are quite similar to those products that Belize already exports. Therefore moving to these new activities would happen comparatively easily, particularly if the government is able to organize itself to learn the sector-specific public goods that the current or potential producers in this sector require.

Jamaica's low-hanging fruit is also concentrated in a narrow range of activities: agriculture and mariculture, as well as a couple of garment and textile sectors (many of the next 10 nearest sectors after the top 25 are also in garments and textiles). It is interesting to note that comparing the two countries, the nearby sectors for Jamaica are much closer in absolute terms. Moreover, Jamaica already has a presence in some of these sectors. Note that this is partly a reflection of the definition of exported, which is based on RCA, meaning that a country with larger total exports will require larger exports in dollar terms before a good is counted as exported, all else equal.

But for Belize and Jamaica, this may not be enough. Since these countries are not in a very well-connected part of the product space, a conservative approach alone will not result in significant structural transformation. Belize in particular, with an extremely low EXPY, is squarely in the strategic bets quadrant of Figure 11 with no pathway to structural transformation: new areas of the product space have to be reached.

But activities that are in new areas of the product space have requirements that are more dissimilar to those activities that currently exist in the economy. Empirically they occur with much less frequency. They are likely to be more difficult as they require the simultaneous appearance of multiple sets of sector-specific inputs, which is more prone to coordination failures: why create

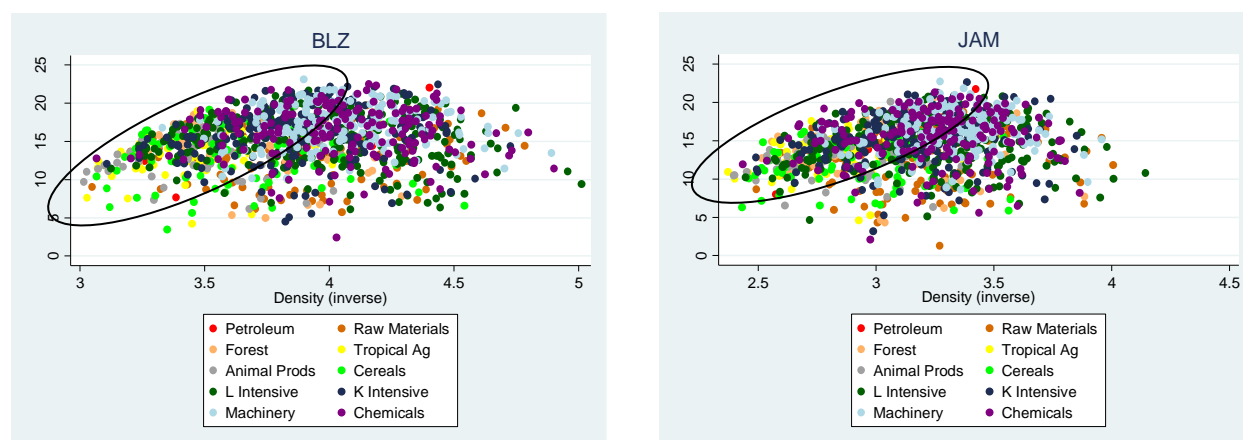
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inputs for a sector that does not exist, and how can firms produce in a new sector without the requisite inputs?

Although more difficult, moving to new parts of the product space can be very valuable. Once an activity in a new part of the product space is occupied, there are then other activities near to it that suddenly become more feasible. That is, activities in a new part of the product space involve the creation of significant new capabilities that then can be applied to other nearby activities with much less difficulty.

So jumping closer is easier, but jumping further can have a larger strategic value. This is illustrated in Figure 14. Each dot in this figure is a product not currently exported. The x-axis is (the log inverse of) density: products further to the right on this axis are further away from the countries' current location in the product space. The y-axis is strategic value: how many other new opportunities are created if this new activity is successful⁴. The “low-hanging fruit” listed in Tables 1 and 2 are the set of products furthest to the left on the x-axis. But we can see in Figure 14 that on average these low-hanging fruit products have a lower strategic value: they do not represent the creation of a host of new capabilities with alternative uses. As you allow for further and further jumps, activities emerge with a much higher strategic value. Of course, not all far-away sectors have a high strategic value: many new activities are far from the countries' current location in the product space but are not well-located in the product space. But there is clearly a tradeoff between strategic value and distance. An efficient frontier in this tradeoff is indicated in the figure by a circle.

Figure 14. Belize and Jamaica's Efficient Frontier: Strategic Value versus Distance



Note: All products not exported with comparative advantage in 2005 for Belize and in 2004 for Jamaica. x-axis is $-1 \cdot \log(\text{density})$, y-axis is the increase in open forest if that product were added to the export basket.

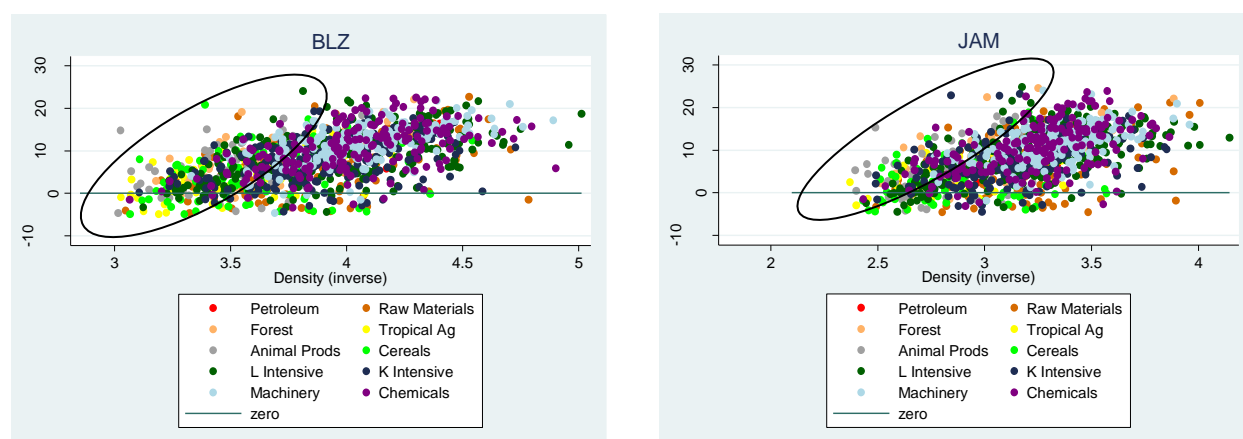
A similar tradeoff can be observed between distance and sophistication. Belize is not only in a sparse part of the product space, but an unsophisticated one. It is specialized in products typical of poor countries, and has only similarly unsophisticated products nearby. Jamaica, in contrast, has a relatively sophisticated export basket due to a few goods in its export basket that are typical of much wealthier countries. But for both countries, to move to more growth-enhancing sectors that pay higher wages (i.e., have a higher PRODY), more distant jumps are needed and such jumps are more difficult. As with the tradeoff between distance and strategic value, there is a tradeoff between

⁴ This is calculated as the increase in open forest if that product were exported with comparative advantage.

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distance and sophistication: if jumping a longer distance, it is better that the sector be worthwhile in terms of PRODY. This is illustrated in Figure 15.

Figure 15. Belize and Jamaica's Efficient Frontier: Sophistication versus Distance



Note: All products not exported with comparative advantage in 2005 for Belize and in 2004 for Jamaica. x-axis is $-1 \cdot \log(\text{density})$, y-axis is the increase in open forest if that product were added to the export basket.

We can identify those products falling into the efficient frontier of both tradeoffs. For Belize, as we move from the low-hanging fruit listed in the table above, the best activities continue to be in agriculture, but increasingly sophisticated and more intensive in valuable and diverse capabilities: nontraditional agriculture, forest products, processed foods, and mariculture. Allowing for longer jumps adds some manufacturing sectors, namely apparel and electronics. As can be seen above, these sectors (the light-blue dots) are quite distant, but they represent the best mix of high wages and stimulation of subsequent structural transformation at that distance, making them sensible considerations.

In the case of Jamaica, both the very nearby products and those slightly up the efficient frontier are agricultural goods, such as dairy products, canned vegetables, and processed fish products. There are also activities in the garments cluster; however, these have a significantly lower PRODY, meaning they typically support only low wages. Allowing for further jumps, other manufactured products enter the efficient frontier, such as simple plastic, as well as many goods in the medicaments and cosmetics industry, such as creams and soaps, non-soap surface-active agents, and hair products.

This type of data-driven identification is only meant to be a suggestive starting-point both to the public and the private sector. It is similar in spirit and in actual implementation to the recommendations sent to me by Amazon.com. In that case the message is: “people who liked this book, also liked this other book.” In our context it says: “countries that are good at the activities at which your country is good are also good at these other activities.” It helps by pointing laterally at activities that do not yet exist but could.

Again, these data only include physical goods, and therefore do not include services like ecotourism, business services, or music recording and producing. However, the basic principles are the same: some new service activities will be nearby existing activities, requiring very similar human capital, infrastructure, and institutions as those used by existing sectors. These low-hanging fruit service sectors could likely emerge with an appropriate parsimonious approach to industrial strategy. Other services that are more dissimilar in their requirements to existing activities will likely suffer

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more from coordination failures and information externalities, and would require a different approach to industrial strategy if they are to emerge.

In both cases, the design principles discussed in the conclusion apply and can help accelerate structural transformation while navigating the pitfalls of traditional industrial policies.

