

From Economic Diversification to Growth

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I. Introduction

Keeping all of one's eggs in one basket is seldom a sound proposition.

Economic diversification away from excessive dependence on a single dominant sector or a few typically natural-resource-based commodities, including change toward increased complexity and increased quality of national output, is of value because it reduces the risks and vulnerabilities associated with a narrow economic base, and enhances a nation's ability to produce high-quality items that other nations may wish to buy. Well-diversified economies tend to be more efficient as well as more open to trade, and thus to have a greater capacity for rapid long-run economic growth. One way of viewing the beneficial effects of economic diversification on growth is through the widely observed inverse relationship across as well as within countries between heavy dependence on a few natural resources and long-run growth, sometimes referred to as the 'resource curse' (Auty, 2002; Sachs and Warner, 1995; Van der Ploeg, 2011). Brenton *et al.* (2009) and Cadot *et al.* (2011) survey the recent analytical and empirical literature on economic diversification and growth.

Natural resource management policies aiming at economic diversification and avoidance of risk reflect the need to manage common property resources in ways that avert the 'tragedy of the commons' – i.e., the danger of overuse and pollution, including global warming, due to unregulated economic interests. Without appropriate incentive structures in place, private parties or public entities or even entire nations may have an interest on selfish grounds in despoiling natural resources, say, fish species in international waters or fresh air. It takes government action and international collaboration to put in place incentive structures that align private interests with the public interest and with the interests of the world community at large. For this reason, economic diversification policies may prove to be intertwined with efficient and fair responses to the overexploitation of common-property natural resources. Along these lines, the call by the heads of the IMF and the World Bank for carbon pricing to mitigate

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climate change (Lagarde and Yong Kim, 2015) echoes the arguments long advanced by economists for market-based solutions for cleaning up the environment (see, e.g., Bergstrom, 1982; Blinder, 1987, Ch. 5; Mankiw, 2009; and Van der Ploeg, 2014).

This essay briefly describes economic diversification as one of several potential drivers of sustained economic growth. Space does not permit the consideration of economic and political diversification side by side where by political diversification is meant the democratization of political processes aiming to reduce the risks and vulnerabilities associated with excessive dependence on a narrow political base. Let it suffice here to assert that political diversification can be gainfully viewed as the twin sister of economic diversification (Gylfason and Wijkman, 2016; see also Cuberes and Jerzmanovsky, 2009).

II. Economic diversification, quality, and complexity

There are several ways to assess economic diversification, including the well-known [Finger-Kreinin index](#) of export diversification (Finger and Kreinin, 1979) and the [Herfindahl-Hirschman index](#) of market concentration, both published by UNCTAD. Here, however, we review recent measures of export diversification and product quality developed by the [IMF](#). The IMF has constructed an export diversification index (EDI) based on the Theil index, a common measure of inequality, segregation, and other forms of diversity. The Theil index – unlike, e.g., the Gini index of inequality – is designed to reflect diversity within as well as among sectors and groups. Specifically, the Theil index equals the sum of measures of diversity across sectors (vertical diversity or extensive margin, meaning new export products or new export destinations) and diversity within sectors (horizontal diversity or intensive margin, meaning a larger volume of exports of old products). The more diversified a country's exports, the lower the EDI.

One reason why export diversification is generally considered desirable apart from considerations of risk is that it helps promote the emergence of high-quality exports, i.e., exports with high unit value. The idea here is that in addition to what and how much a country exports it also matters to whom the exports are sold. Put differently, geographic diversification is desirable in addition to economic diversification in that selling the same product to several different customers spreads risk in a similar way as selling several different products to the same customer. This can be seen as a variation on a familiar theme from economic growth theory: Good neighbors are good for a country's

long-run growth (Ades and Chua, 1997). Along these lines, the IMF has recently also produced time series intended to measure the average quality demanded in an exporter's current destination markets for a product where a value of 1 characterizes an exporter whose exports of a given product go to destinations that demand a high quality of that product on average in their imports (Henn *et al.*, 2013). The product quality index (PQI), produced through elaborate modeling (IMF, 2014), ranges from 0 (low quality) to 1.2 (high quality). Hence, higher quality of exports is reflected in a larger value of the PQI. The EDI and the PQI for ten countries, including seven net oil exporters, are shown side by side in Fig. 1A and 1B.

Because they cover only goods and not services, the IMF measures shown in Fig. 1 tell only a part of the story of economic diversification. This matters because the economic diversification strategies of many countries focus increasingly on branching out into services, the world's largest economic sector by far measured either in terms of manpower or share in total output. The argument that diversification reduces risk applies also to services and to tangible goods. Further, the expansion of services can be a strong catalyst of goods exports, directly as well as indirectly through spillover effects (Cattaneo, 2009). Disaggregated statistics on services, enabling statisticians to measure the diversification, concentration, and quality of services, remain to be compiled and analyzed. Economists at the IMF are presently at work on compiling an international data base on services to expedite a balanced coverage of goods and services exports in studies of economic diversification.

Related to the IMF measure of product quality, there is yet another way of looking at export diversification (Fig. 1C). The [Economic Complexity Index](#) (ECI) developed by Hidalgo and Hausmann (2009) ranks countries by the diversity and complexity of their export structure. The most complex products are sophisticated chemicals and machinery, while the least complex products are raw materials and simple agricultural products. Countries that produce complex goods as well as a large number of products are typically more advanced or likely to experience more rapid economic growth in the future than are countries producing fewer and less complex products. If so, the ECI can be used to assess economic development. The consideration of economic complexity adds a potentially useful dimension to the analysis of economic diversification. Greater economic complexity is reflected in a higher value of the ECI as defined here. In Fig. 1C, the original ECI rank has been converted to an index representing the relative ranks of

the ten countries by the formula $100*(1 - \text{rank}/124)$ where 124 is the number of countries included in the ranking. The number of countries covered by the ECI was 121 in 1995 and 124 in 2013. The more complex the products, the larger is the index.

III. From economic diversification to growth

There is some empirical evidence suggesting that economic diversification and long-run economic growth tend to go together over time as well as across countries, partly because diversified economic activity and diversified exports reduce risk and instability, thus strengthening the foundation of economic growth over time. Fig. 2 shows the cross-country relationship between different measures of economic diversification and long-run growth. In Fig. 1A, we see how the Theil index of export diversification developed by the IMF goes along, in an economically as well as statistically significant way, with per capita GNI adjusted for purchasing power, interpreted as an indicator of past economic growth on the grounds that a country's income today reflects its economic growth performance in the past. Fig. 1A shows a significantly positive cross-country correlation between the average value of the Theil index of economic diversification and the natural log of per capita GNI in a sample of the 164 countries for which data are available, not including the six GCC countries (Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and United Arab Emirates) that are characterized by high per capita incomes and low diversification. We see how per capita incomes and diversification go hand in hand from southwest to northeast. If Fig. 1A is taken to suggest that diversification is a determinant of growth rather than the other way round and if the slope of the regression line shown in the right panel, -0.57, is taken at face value, the regression coefficient suggests that an increase in diversification by one point, spanning a fifth of the scale observed across countries from 1 to 6, would in the average country go along with an increase in per capita GNI by 57%.

Bivariate correlations such as those shown in Fig. 2 do not allow us to make any valid inferences about cause and effect. While theory suggests that economic diversification can be good for growth, economic growth is probably also conducive to diversification (Brenton *et al.*, 2009; Cadot *et al.*, 2011). However, Fig. 2 does not seem to support the hypothesis of a U-shaped relationship reported in several studies to suggest that diversification, while prevalent in many low-income countries, tends to slow down or reverse course at higher levels of income as new opportunities for specialization arise

(see, e.g., Imbs and Wacziarg, 2003; Klinger and Lederman, 2004; and Cadot *et al.*, 2011). But whether economic diversification and growth tend to go hand in hand only up to a certain mid-range level of per capita GNI or the relationship persists at high levels of income, available empirical evidence, including Fig. 2, serves as a warning against excessive specialization, especially in early stages of economic development.

Next, we look at the IMF's Product Quality Index introduced in Fig. 1B. In Fig. 2B, we see a highly significant correlation between the average value of the PQI during 1962-2010 and the latest available level of per capita GNI. Per capita incomes and product quality go hand in hand from southwest to northeast in the figure. Specifically, when product quality increases by 0.1, an increase that spans one sixth of the range of the variable from 0.5 to 1.1, per capita GNI rises by 53%, a figure that is similar to the one deduced from Fig. 2A. The causation, if that is what the pattern suggests, must run from product quality to growth because per capita GNI in 2014 cannot possibly have had a retroactive influence on the PQI. The same remark applies to Fig. 2A and 2C.

At last, Fig. 2C shows the cross-country relationship between per capita GNI and the Economic Complexity Index (ECI) introduced in Fig. 1C. Once more, we see a significantly positive relationship suggesting that a 20-point increase in complexity from one country to another, spanning a fifth of the scale from 0 to 100, goes along with an increase in per capita GNI by 58%, again a similar result as before.

All in all, the cross-sectional correlations presented in Fig. 2 suggest a clear cross-country connection between economic growth and economic diversification, product quality, and complexity. If so, economic diversification is not only desirable in its own right but also because it may be an independent catalyst of economic growth. Digging deeper into the data by panel estimation methods to see if the significance of the cross-sectional patterns reported here is preserved within as well as across countries – i.e., across time as well as space – must await further work. Perhaps such an undertaking ought to await the anticipated availability of disaggregated trade data covering services as well as products. It would also be of interest to see if indices of geographic diversification of trade are correlated with economic growth across countries which is not a foregone conclusion in view of the insights and empirical results from gravity models that suggest that countries generally prefer trade with their neighbors to trade with more distant countries (see Anderson, 2011).

IV. Conclusion

The desire for economic diversification can be justified, *inter alia*, on the grounds of the observed cross-country relationship between different measures of economic diversification and macroeconomic performance. This relationship suggests that diversification is good for long-run growth. One possible way to interpret the cross-country evidence is to view economic diversification as an essential element of rapid and sustainable economic growth. Before we can reach that conclusion, however, the data on economic diversification need to be extended from goods alone at present to include goods and services, work that is underway at the IMF. In principle, the diversification of services should reduce exposure to macroeconomic risk in the same way as the diversification of goods for export. The same argument can be extended, *mutatis mutandis*, to capital flows.

The foremost policy measures needed to manage natural resources efficiently and fairly and to mitigate climate change – notably, the regulation of emissions by price rather than by quantity, i.e., by levying fees on emissions rather than imposing quotas as stressed by Blinder (1987), Gylfason (1992), Matthíasson (2001), Gylfason and Weitzman (2003), Mankiw (2009), Lagarde and Yong Kim (2015), and many others – are intimately related to those measures that can be most effectively used as instruments of economic diversification. This is because climate change and excessive specialization in especially natural-resource-based production share a common characteristic: As a rule, natural resource wealth and the earth's climate are common-property resources that need to be viewed and managed as such. Oil and other mineral reserves, fish stocks, etc., and our common climate are limited resources. Chemical pollution from burning oil and coal, overexploitation that threatens valuable fish species, and climate change are comparable forms of environmental degradation all of which call for efficient and fair conservation by price.

Efficiency and fairness require levying user fees on those who want to drill for oil, burn coal, catch fish, and emit carbon and other gases into the atmosphere, fees that should take the form of selling preferably transferable utilization licenses to users. This follows from the 'polluter pays principle' first recommended by the OECD in 1972 and subsequently included in the European Union's first Environmental Action Program 1973-1976 and, since 1987, enshrined in the Treaty of the European Communities as well as in the laws of many countries around the world.

The revenue from such fees needs to accrue to the right owner of the resources in question – that is, where appropriate, to the state on behalf of the people – and can be used to finance further conservation of the environment as well as to reduce taxes (Metcalfe, 2007) or increase public spending.

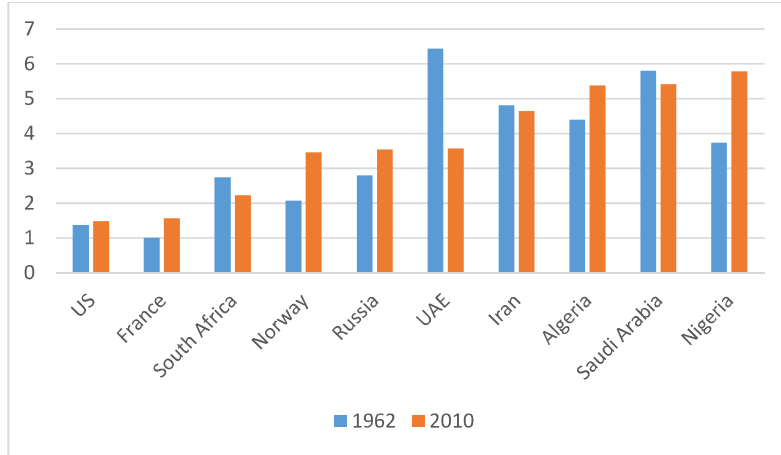
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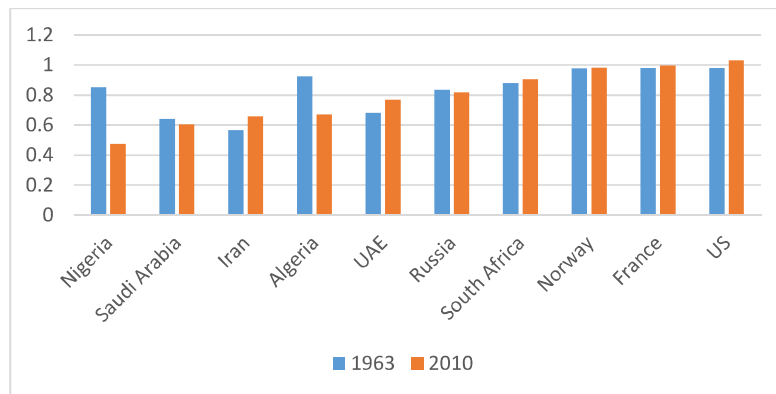
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Figure 1. Measures of economic diversification

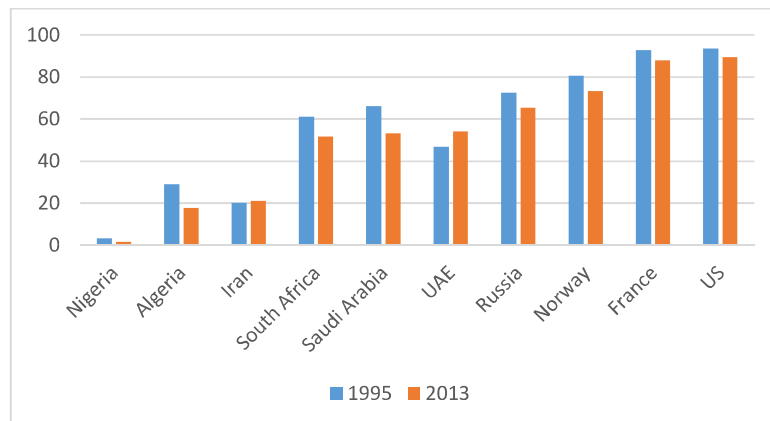
A. Theil Export Diversification Index (EDI)



B. Product Quality Index (PQI)



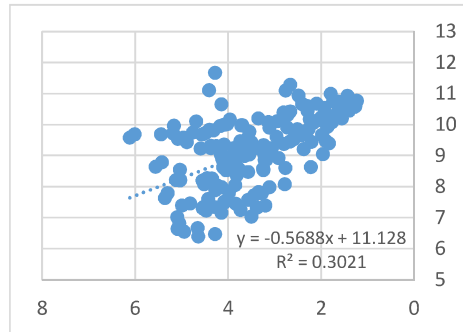
C. Economic Complexity Index (ECI)



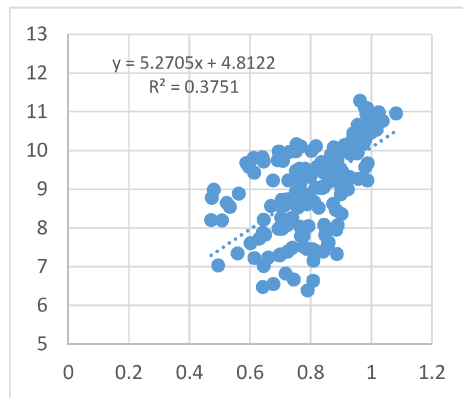
Source: Author's computations based on data from [IMF](#) (Panels A and B) and [Atlas of Economic Complexity](#) (Panel C). Higher columns denote less diversification in Panel A, and more diversification in Panels B and C.

Figure 2. Economic diversification and growth

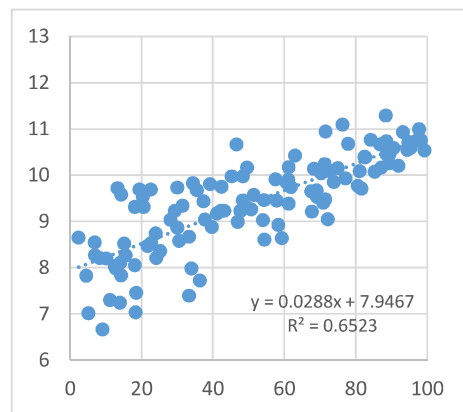
A. Economic diversification: 164 countries, all except six GCC countries



B. Product quality: 168 countries, all except six GCC countries



C. Economic complexity: 116 countries, all except five GCC countries



Source: Author's computations based on data from World Bank, [World Development Indicators](#), and [IMF](#) (Panels A and B) and [Atlas of Economic Complexity](#) (Panel C). Note: Log of per capita GNI on vertical axes. Rising curves mean more diversification on horizontal axis; Panel A: Theil index of diversification on horizontal axis; Panel B: Product Quality Index on horizontal axis; Panel C: Economic complexity on horizontal axis, defined as $100 \cdot (1 - \text{rank}/124)$ where 124 is the number of countries included in the ECI ranking in Hidalgo and Hausmann (2009). The six GCC countries excluded from Panels A and B are Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and United Arab Emirates. The ECI is not available for Bahrain so only five GCC countries are excluded from Panel C.