



# Economic Premise

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## A Future without Oil? Diversifying Options for Trinidad and Tobago

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*Trinidad and Tobago (T&T) is an example of successful diversification within the oil and gas sector and the country is now a global player in the energy industry. Diversifying its asset base so that the nonresource sector can continue to grow and generate jobs once the country's oil reserves are depleted is also an important priority for Trinidadians. With reserves of oil and gas in T&T expected to be exhausted by 2025–30, the government is focusing more and more on options for diversification. Although many countries have grown and improved their development outcomes while remaining highly dependent on natural resource rents, the obvious concern is what will be the sources of growth for the country when oil runs out? In this context, this note identifies the binding constraints and potential drivers to further economic diversification in T&T.<sup>1</sup>*

### Why Is Diversification Important for T&T?

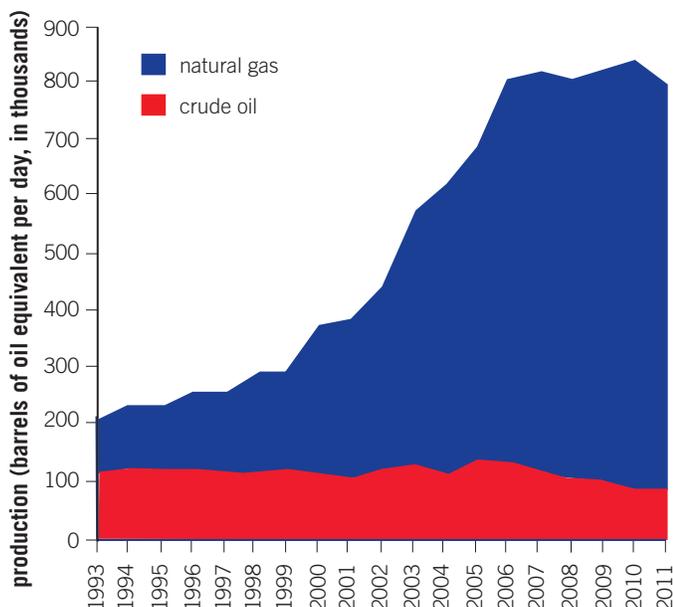
T&T can be characterized as a dual economy. With a gross national income (GNI) per capita of US\$14,710 in 2012, the country is a high-income country, rich in natural resources, with a well-developed globally competitive oil and gas industry. The nonenergy sector is relatively underdeveloped, attracting little investment and, to a significant extent, depends on government subsidies and transfers.<sup>2</sup> T&T's economy has also been historically quite volatile and particularly susceptible to commodity price shocks.

As with most natural resource rich economies, the issue of economic diversification has been extensively debated in T&T since the 1950s. This discussion has taken on a new sense of urgency given recent revelations that the country's largest industry, the oil and gas industry (45 percent of GDP), could disappear within 15 years unless new reserves are found. In conjunction with exploration efforts, the government has been aggressively pushing for answers to the question of how best to diversify the country's economic base.

There is evidence that vertical diversification has occurred within the energy sector. Oil production has been following a declining trend since the 1980s, and has been replaced by natural gas as the dominant activity in the energy sector (figure 1). In addition, growth in production of petrochemicals has mirrored growth in the production of natural gas. T&T has become the world's leading exporter of ammonia and methanol, which, along with urea, make up the main petrochemical products in the country.

While vertical diversification is welcome, the major question that confronts policy makers relates to the slow pace of horizontal diversification. More specifically, what could be the major impediments to further diversification in the country? Has T&T paid enough attention to the diversification of its asset base (that is, its human and physical capital) and its institutions? This note discusses the main determinants of export concentration in T&T and the significance of potential drivers of diversification away from the resource sector in the context of a country that has already successfully diversified vertically within the industry.

**Figure 1. Crude Oil and Natural Gas Production**



Source: Central Bank of Trinidad and Tobago.

## The Literature on Diversification in T&T

A number of authors have analyzed the structure of the twin-island economy and reported what they consider to be major impediments to growth and development as well as to reduction of the country's industry concentration. Using a Growth Diagnostic Methodology developed by Hausmann, Rodrik and Velasco (2005), Artana et al. (2007) found that the most important factors limiting growth opportunities in T&T result from limited human capital, high macroeconomic volatility, inadequate development of infrastructure, inadequate access to foreign markets, rising criminality, lack of innovation, corruption, and a burdensome bureaucracy.

Elias and Rojas-Suárez (2007) analyzed T&T's institutions and documented poorer than expected quality-of-governance indicators. The authors claim that, in the absence of improvements in terms of governance, the country might not be able to achieve sustainable high gross domestic product (GDP) growth rates. Other authors, in particular Balgobin and Omar (2006), found that the development of the private sector seems to be hindered by weak and inefficient public sector institutions that result in administrative delays and unnecessary costs.

## How Diversified Are T&T's Exports?

The Herfindahl-Hirschman index (HH index) is used to measure export diversification and is one of the most commonly used proxies for the economywide level of diversification. It is calculated as follows:

$$\text{Herfindahl-Hirschman Index} = \sum_{i=1}^n S_i^2,$$

where  $S_i$  is the share of industry  $i$  in total exports, and  $n$  the number of sectors in the economy. The HH index is the sum of squared shares of each product in total export. A country with a perfectly diversified export portfolio will have an index close to zero, whereas a country that exports only one product will have a value of 1 (least diversified).<sup>3</sup>

Table 1 shows the average diversification performance for selected countries during 1980–2010. T&T appears to have made significant progress in terms of diversification over the last three decades (its HH index did contract by more than 70 percent). The twin-island country has also rapidly transformed in terms of diversification relative to other countries with similar structural characteristics. There seems to be greater limitations in terms of diversification for net oil exporters, as the average HH index for this group of countries is above the HH average for all other groups.

Since the end of the 1990s, T&T has ranked below the net oil exporters' average concentration index. Also, while T&T has become more diversified over the past 30 years, it has remained less diversified than the average of country groups with which it shares significant structural characteristics. In 2010, the energy sector still accounted for 66 percent of exports and 44 percent of GDP, while it only employed 3 percent of the labor force. Most of the country's diversification has indeed happened within the energy sector, as shown in figures 2 and 3.

## Who Are T&T's Comparators?

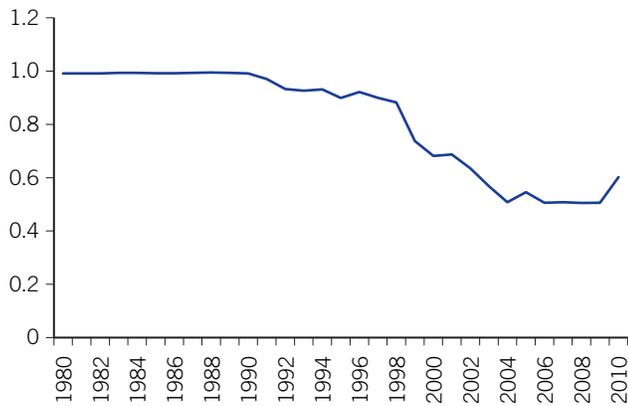
To put the experience of T&T into perspective, we constructed a group of comparable countries and developed a consolidated net commodity exporter category. Countries that fit into this category are defined as net exporters of fuel, metals, and ores for at least five years between 2000 and

**Table 1. Export Diversification Performance**

Country	HH index			
	1980	1990	2000	2010
T&T	0.8706	0.4597	0.3059	0.2480
Indonesia	0.3743	0.1305	0.0543	0.0560
Saudi Arabia	0.9414	0.7424	0.8377	0.6916
World	0.2553	0.2168	0.2399	0.1957
LAC	0.3573	0.2427	0.1872	0.1816
Caribbean	0.5328	0.3508	0.2227	0.1607
Net oil exporters	0.3580	0.3068	0.3684	0.2691
Island countries	0.3059	0.2286	0.2652	0.2429
Net oil exporter Islands	0.3566	0.2441	0.1516	0.1161

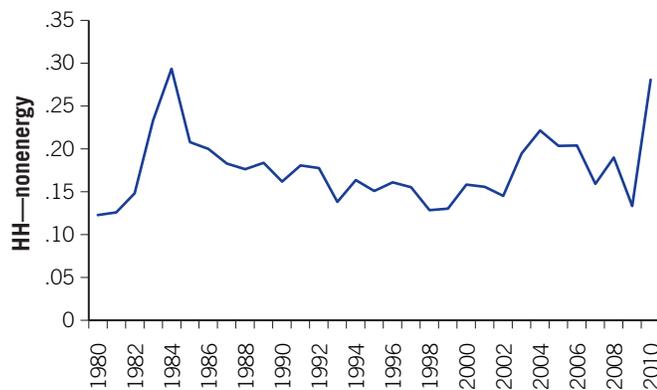
Source: WITS and authors' calculations.

**Figure 2. HH—Energy Sector**



Source: WITS; authors' calculations.

**Figure 3. HH—Nonenergy Sector**



Source: WITS; authors' calculations.

2010. The list of control countries is restricted to non-OECD (Organisation for Economic Co-operation and Development) and non-European Union member countries because these countries share particular institutional characteristics. Additionally, given the size of T&T's economy, countries with a total population greater than 10 million are excluded. This results in a list of 15 control group countries located across different regions.<sup>4</sup>

The rationale behind the creation of this comparison group is to have a set of countries similar to T&T at hand so as to: (i) assess whether commodity-rich countries share particular characteristics in terms of diversification, and (ii) evaluate whether specific policies have a differentiated impact between commodity exporters and commodity importers.

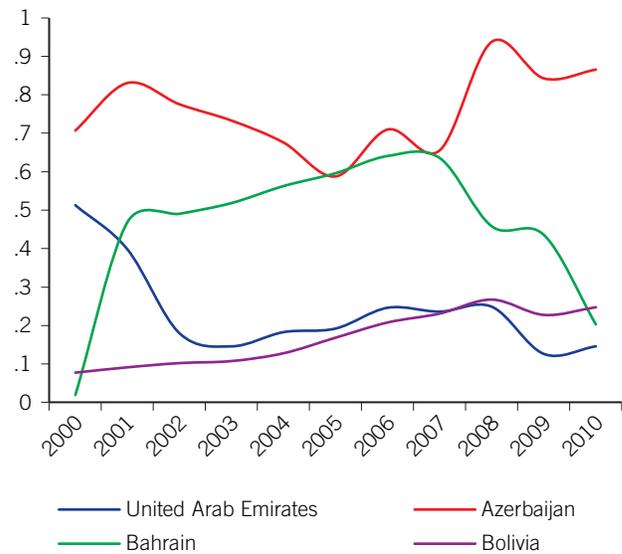
There appears to be a significant amount of heterogeneity and volatility in the diversification experience of the countries selected (figures 4 and 5). Notably, while Bahrain, Oman, and the United Arab Emirates have successfully expanded the range of economic activities oriented toward foreign markets in the second half of the last decade, the level of export concentration has gradually increased in Bolivia and the Central African Republic. Some sharp diversification reversals are observed for

Azerbaijan and Gabon in the latter half of the decade. The experience of T&T, although starting from a lower concentration level, appears to be rather analogous to Qatar and Oman.

### Potential Diversification Drivers

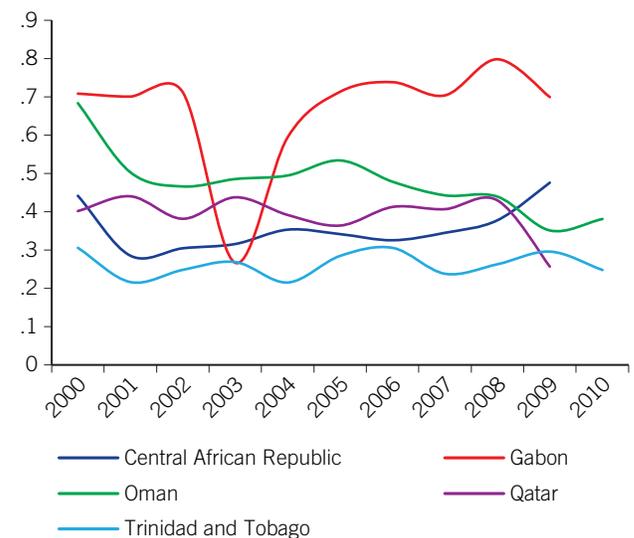
This exercise adopts elements of the framework developed by Al-Kawaz (2008) and Agosin, Alvarez, and Bravo-Ortega (2012) to determine the potential drivers of concentration/diversification in selected oil-producing states. Using pooled, weighted, least squares regressions over 1991–2001, Al-Kawaz found investment and higher quality institutions to have a strong and positive impact on diversification. Higher inflation discourages the development of new activities. Finally, openness to trade seems to foster diversification.

**Figure 4. Evolution of the HH Index in Selected Countries (I)**



Source: WITS.

**Figure 5. Evolution of the HH Index in Selected Countries (II)**



Source: WITS.

## Box 1. Estimation Methodology

### Generalized Method of Moments

To assess the determinants of economic diversification, this exercise relies on dynamic panel Generalized Method of Moments (GMM) estimations following Agosin, Alvarez, and Bravo-Ortega (2012) and estimate equation (1):

$$D_{i,t} = \alpha + \beta.D_{i,t-1} + \gamma.X_{i,t} + \eta_i + d_t + v_{i,t} \quad (1)$$

where  $D_{i,t}$  is the Herfindahl-Hirschman index of export concentration for country  $i$  at time  $t$ , which is explained as a function of a matrix of explanatory variables  $X_{i,t}$ , the lagged value of the Herfindahl-Hirschman index of export concentration  $D_{i,t-1}$ , a country fixed effect  $\eta_i$ , a time dummy  $d_t$ , and  $v_{i,t}$  an error term.

The index of concentration is lagged to account for the persistence of the export structure over time, and the country fixed effects account for the influence of unobserved time-invariant country-specific characteristics that may explain diversification patterns across countries. In addition, the use of fixed effects mitigates the potential impact of having a nonrandom sample. Some countries are more likely to have gaps in their data due to an unobservable effect, and this is captured to some extent by the fixed effect (Wooldridge 2010, 488).

For estimation purposes, 1980–2010 is divided into six subperiods of five years. The average of all variables included in the estimation is computed for each period  $t$ . This allows elimination of the influence of business cycles on the results as well as minimization of the potential for attenuation bias stemming from measurement errors in the data.

Equation (1) is estimated with the GMM system estimator of Arellano and Bond to solve the econometric problems caused by the presence of the lagged dependent variable in the set of the right-hand-side variables. The GMM system

Source: Authors' compilation.

Similarly, Agosin, Alvarez, and Bravo-Ortega (2012) empirically estimate the determinants of export diversification using a large data set covering 161 countries over 1962–2000. Their results suggest that greater trade openness induces higher specialization. Additionally, some of the results suggest real exchange rate volatility has a positive effect on concentration, whereas overvaluation has no significant effect on concentration. Human capital accumulation is found to be positively associated with diversification. Moreover, while positive terms of trade shocks tend to increase export concentration, the effect appears to be less important for countries endowed with higher stocks of human capital.

### Has Foreign Direct Investment Contributed to Greater Export Diversification in T&T?

The findings suggest that access to finance, terms of trade shocks, and foreign direct investment (FDI) inflows have significant effects on diversification. Other things being equal, countries receiving more direct investments tend to be more

estimator has been demonstrated to be more efficient and less biased than the Arellano and Bond difference estimator (Kpodar 2007). The system estimator combines lagged levels as well as lagged differences as instruments. The period dummies are treated as strictly exogenous, while all the other explanatory variables are considered non-endogenous. The size of the matrix of instruments is reduced to avoid over-instrumentation bias, and the autoregressive model is estimated with robust standard errors.

### Data

The set of potential drivers analyzed is similar to those from Agosin, Alvarez, and Bravo-Ortega (2012) and Al-Kawaz (2008). The main difference is that Al-Kawaz uses the square value of per capita income and the square value of investment to represent the effect of the early and later stage of economic growth process on diversification. Instead, this has been replaced by GDP per capita expressed in logarithm to capture the nonlinear impact of economic development. Additionally, this exercise uses a much larger data set covering many countries (1980–2010). Supplementary to the set of variables used here, Agosin, Alvarez, and Bravo-Ortega (2012) also look at the effect of economic distance on concentration. In addition, besides using the HH index, they also test the robustness of their results with two other measures of concentration: the Gini index and the Theil indicator.

The set of potential drivers in this exercise is divided into three main categories: economic reforms (trade openness and access to finance), structural factors (country population, human capital, and quality of institutions) and macroeconomic variables (real exchange rate, inflation, net FDI inflows, terms of trade, and investment as a share in GDP).

diversified. This could be an indication that foreign investors tend to develop new industries instead of pooling their resources in sectors already oriented toward international markets. Terms of trade shocks appear to be associated with a concentration of the export base, suggesting that relative price variations are accompanied by a reallocation of factors of production toward the sectors where profitability has increased. In addition, an interaction term between terms of trade and human capital included in our model is significant and negative, suggesting that the concentrating effect of terms of trade shocks is less important for those countries with higher levels of human capital.

The level of financial development has a negative and significant coefficient. By reducing liquidity constraints, greater access to credit may indeed stimulate export activities. Countries where investors face fewer barriers to credit are more diversified. Real exchange rate variations also appear to have a strong impact on diversification patterns. Currency real appreciations are found to translate into a higher concentration

of the export base. This is consistent with the argument that a real appreciation reduces investment profitability.

Institutional quality and a commodity exporter dummy were used to test for a conditional effect of resource wealth. One may expect that countries with stronger institutions control rent-seeking behaviors associated with mineral wealth better and more effectively reorient resource rents toward other sectors of the economy. However, the coefficient estimate turned out to be insignificant.

To address the concern that, in island countries, FDI inflows may have a different effect than in other countries, a dummy for island nations was interacted with FDI inflows. While the interacted term is not significant, all the other dependent variables remained significant and kept the same sign, suggesting that the effect of FDI on diversification does not differ in island countries.

GMM system estimates with standardized variables are also applied, which enables ranking of the diversification determinants by order of magnitude. The results show that real exchange rate variations have the largest effects on concentration patterns. In fact, a 1 standard deviation increase in real exchange rate depreciation leads to a 1.8 standard deviation decrease in concentration.

FDI is the determinant with the second largest potential impact on diversification. A 1 standard deviation increase in FDI inflows is associated with a 10.7 percent increase in diversification. The list of determinants with the largest potential impact on diversification is followed by access to finance in third place, and terms of trade shocks in fourth place. Additionally, a 1 standard deviation increase in access to finance and terms of trade leads to an 8.5 percent decrease and a 7.0 percent increase in export concentration, respectively.

T&T is characterized by relatively large and volatile capital inflows compared to other countries in the Latin America and Caribbean (LAC) region. FDI inflows averaged 6.6 percent of GDP during 1988–2011, above the LAC average of 2.4 percent of GDP over the same period. In the 1980s and 1990s, T&T was able to maintain its position as a top performer in terms of the amount of investments it was successful in attracting. In the 2000s, however, the number of countries showing very attractive profiles for FDI as well as the diversity of profitable sectors for FDI significantly increased. Additionally, FDI inflows in T&T were severely impacted in 2009 and 2010 by the global financial crisis.

FDI in T&T has been mostly concentrated in the energy sector, particularly in the oil sector first, and, at a later stage, in the natural gas projects following deregulation of the sector. This transition helped the economy to diversify its energy sector, but not the nonenergy sector (ECLAC 2003). Later, the country succeeded in attracting new investments in other sectors, but this only slightly expanded the numbers of econom-

ic sectors in the economy. Not having a developed nonenergy tradable sector will probably continue to limit future growth due to lack of externalities in production, lack of forward and backward links, shortages of learning by doing, and lack of entrepreneurship. Consequently, the country has taken measures to stimulate the non-resource-based economy.

Over the last decades, the government of T&T has taken numerous measures directly aimed at encouraging FDI inflows into the energy and nonenergy sectors. FDI was also implicitly considered a strategic means of diversification because it was believed FDI would also act as a source of revenue for investments in physical and human capital, which the country needed to support the development of other sectors. The economy maintained strong tax incentives (bilateral investment agreements, double taxation treaties, and reciprocal regulatory agencies arrangements) and supported the implementation of free trade zones (FTZs) to facilitate export diversification. The aim was to use these initiatives to overcome obstacles and distortions in the rest of the country and eventually generate forward links to the development of manufacturing industries outside the energy sector. The government has also tried to actively promote foreign investments and es-

#### **Box 2. Has T&T Been Suffering from “Dutch Disease”?**

In the case of T&T, it is not actually knowing whether the country has suffered from Dutch disease, but the extent to which the phenomenon has been harming the country's development. Indeed, Mohammed, Moya, and Sookram (2010) claim that in T&T, Dutch disease is not a cyclical phenomenon, but a permanent characteristic of the economy, given the historical preponderance of oil and gas in total exports over the last three decades. Artana et al. (2007) argue that the Dutch disease phenomenon accounts for only some of the reasons why T&T has failed to significantly develop its nonenergy sector. Artana et al. find several other factors that have limited the expansion of economic activities in line with the findings presented here. First, evidence shows that natural resource abundance has affected public policies. Fiscal policy has been rather pro-cyclical in past years, and even though prudent fiscal management mechanisms have been created lately, the credibility of the authorities has suffered, exacerbating the macroeconomic risk perceived by business leaders. Second, the unsatisfactory quality of education appears to be another binding constraint in their study. Insufficient innovation and technological readiness outside the energy sector are listed as further impediments. Infrastructure bottlenecks also constrain diversification. Lastly, the rising criminality observed in recent years also appears to discourage entrepreneurship.

*Source:* Authors' compilation.

*Note:* Dutch disease is a term that broadly refers to the harmful consequences of large increases in a country's income. Although the disease is generally associated with a natural resource discovery, it can occur from any developments that result in a large inflow of foreign currency, including a sharp surge in natural resource prices or foreign assistance (Ebrahim-Zadeh 2003).

tablished the Trinidad and Tobago Country Branding and Investment Promotion in charge of the administration of existing industrial parks.

Given the high ratio of FDI to GDP in T&T, evidence of the lack of diversification outside the energy sector suggests that T&T has not been able to fully maximize the potential benefits of the large FDI it has received. As Mohammed, Moya, and Sookram (2010) indicate, the additional benefits that a foreign investor can bring depend on whether that investor generates spillovers to the rest of the economy through employment, technology, or innovation. This, at the same time, is strongly associated with the type of activity of the investing company and how it connects to other producers. The findings of Mohammed, Moya, and Sookram (2010) also show that FTZs have stronger spillover effects in countries where the local technology can be complementary to the FDI, and weaker effects in countries with a wide technological gap. This may be a partial explanation as to why FDI inflows have not substantially fostered diversification outside the energy sector in T&T. The country's technological and human capital are indeed still below its potential outside of the oil and gas sectors. Linking FDI incentives to human and technological capital development, as well as finding various ways of engaging the domestic and foreign private sector in this mission, would enable T&T to better seize the benefits of FDI in terms of economic diversification.

## Conclusion and Policy Implications

T&T is successfully diversifying its energy sector. With this, the country has converged toward the world average level of export concentration for 1980–2011, and T&T is now known as a global player in the oil and gas industry, instead of being recognized solely as an oil-based economy. Nevertheless, further diversification away from the oil and gas sectors remains an important objective because it would reduce its economic vulnerability to commodity price shocks and help secure output growth for many years after the full depletion of the countries' limited oil and gas resources.

While this analysis highlights openness to FDI and access to finance as fundamental determinants of economic diversification, the available evidence suggests that FDI to T&T has not led to significant dynamism and structural transformation. The key question for the authorities is thus, how to transition from reinforced resource-based activities to greater nonenergy diversification and new specialization in the high-value segments of energy activities?

Findings presented here suggest that T&T should aim to attract more FDI in the nonenergy sector and take measures to increase FDI-induced spillovers in the energy sector. Based on the findings of the literature on FDI determinants, this could be achieved by participating more actively in regional

trade agreement initiatives, because this would increase access to the international markets that its local and foreign producers enjoy. Improving the functioning of the domestic financial markets could also facilitate the creation of new business activities and generate employment opportunities.

While Trinidadian education is already recognized internationally for its good quality, there is scope to improve it further. Secondary and tertiary education as well as research and development are important for maximizing FDI's full benefits, and the authorities may consider investing more in these domains. Expanding the knowledge base of the economy would facilitate the development of new activities and also make the country more attractive to foreign investors.

T&T's technological capacity needs improvement. An additional challenge for the country would be to find a way for domestic and foreign private sector entrepreneurs to participate in this effort and also agree to transfer technological knowledge. Similarly, bilateral trade and investments treaties, as well as institutional reforms, are policy options the government of T&T could seize to help reduce the concentration of the country's economy.

Finally, a resource-rich economy that diversifies its economic structure, its products, and its partners—and that becomes less reliant on its most abundant endowment—is also less sensitive to macroeconomic shocks transmitted through large fluctuations in commodity prices. And with resource extraction highly capital-intensive, diversification creates additional sources of employment for the labor force. Indeed, recent research (World Bank 2013) finds a positive association between rising economic diversification and rising per capita income for countries with per capita incomes of up to US\$20,000. Beyond that level, economies tend to reconcentrate, though high-income countries do not reach the concentrations usually found in low-income countries.

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## Notes

1. This Economic Premise note draws on “*Toward Economic Diversification in Trinidad and Tobago*,” a paper published in

April 2014 in the World Bank Working Paper Series, and will appear as well later this year in a special edition by the University of West Indies with a selection of the papers presented in a 2012 conference to commemorate the 50th anniversary of the independence of Trinidad & Tobago.

2. Between 1994 and 2008, the country's output grew at an impressive average rate of 7.1 percent. Yet, most of this growth can be attributed to the performance of the oil and gas sectors, supported by high energy prices. Over the last decade, average annual GDP growth in the petroleum sector averaged 9.7 percent. The nonenergy sector, on the other hand, exhibited much slower growth rates, with a decade mean of 3.6 percent.

3. Observations for the HH index are extracted from the World Integrated Trade Solution Database (WITS) and are calculated with annual country export data recorded in the SITC Revision 2 COMTRADE database. Two-digit level data are used.

4. The net commodity exporter countries' control group considered was integrated by: United Arab Emirates, Brunei Darussalam, Guinea, Oman, Azerbaijan, Bhutan, Kuwait, Papua New Guinea, Bahrain, Central African Republic, Mongolia, Qatar, Bolivia, Gabon, Namibia, and Trinidad and Tobago.

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