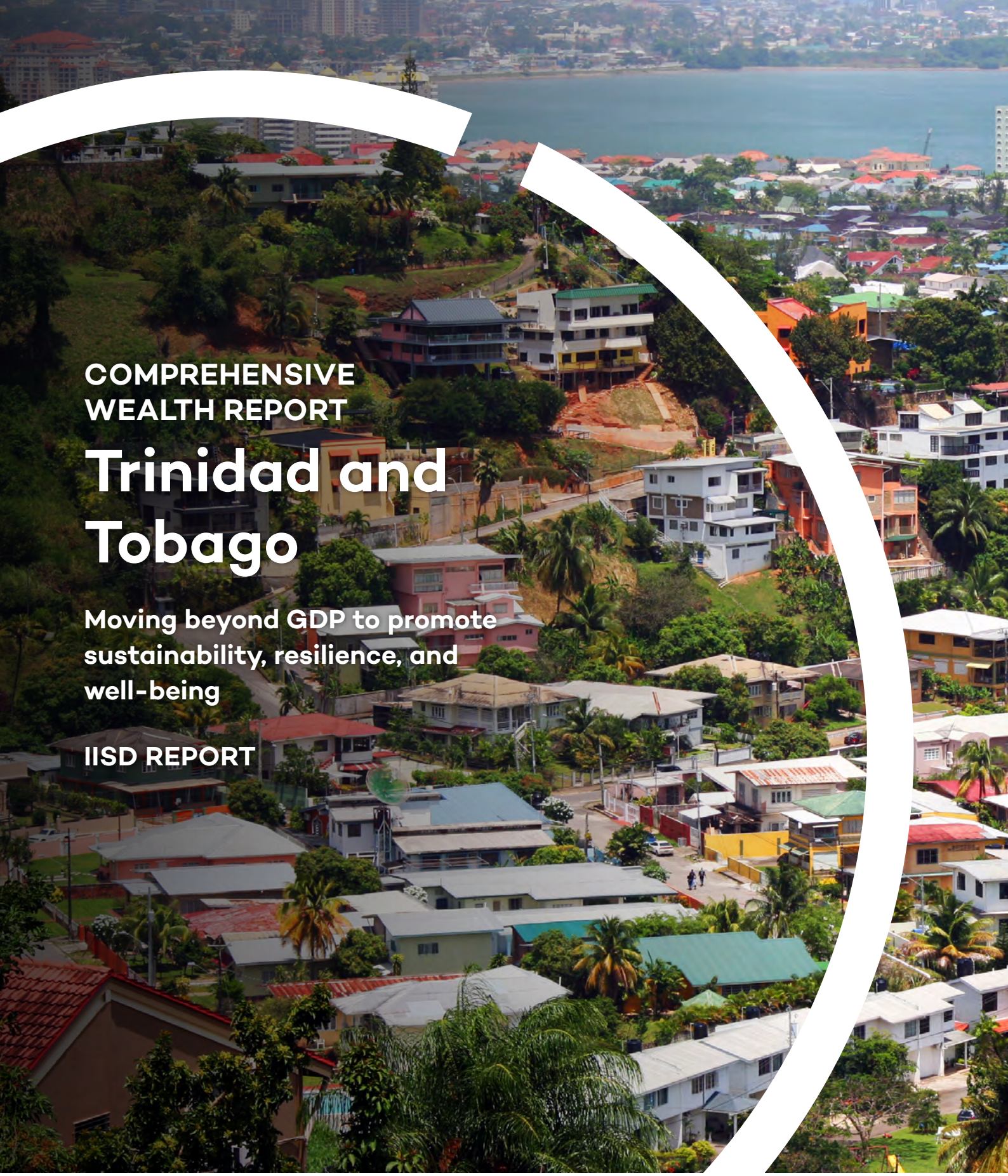

COMPREHENSIVE WEALTH REPORT

Trinidad and Tobago

Moving beyond GDP to promote sustainability, resilience, and well-being

IISD REPORT

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Comprehensive Wealth Report — Trinidad and Tobago: Moving beyond GDP to promote sustainability, resilience, and well-being

April 2024

Written by Godfrey St. Bernard, Shari Johnson, Semone Armorgan, Lavaughn Pritchard from The University of the West Indies, St. Augustine, Trinidad and Tobago; Zakaria Zoundi and Livia Bizikova from the International Institute for Sustainable Development; and Robert Smith from the International Institute for Sustainable Development and Midsummer Analytics.

Photo: iStock

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Dedication

The authors dedicate this report to the memory of Kirk E. Hamilton, whose untimely passing on February 6, 2024, left the world without one of its pioneers in the conceptual and practical development of comprehensive wealth accounts. Hamilton authored or co-authored many of the seminal works in the field and devoted much of his professional career to establishing the *Changing Wealth of Nations* program at the World Bank. His sharp insights, lucid writing, and careful analysis have, fittingly, created a rich endowment to draw upon. It is up to those who remain to build on this and ensure that comprehensive wealth accounting features prominently in the measurement of progress beyond GDP.

Executive Summary

The compilation of **comprehensive wealth** measures for Trinidad and Tobago reveals unsettling trends that GDP does not. While GDP growth suggests sound economic development from 1995 to 2020, comprehensive wealth paints a picture of moderate progress at best and suggests the country is on an unsustainable path. Over the period 1995–2020, real (inflation-adjusted) per capita GDP[1] more than doubled. Real comprehensive wealth per capita, on the other hand, increased much less, growing by only 11% (Figure ES1).

Following the 2008 global recession, real comprehensive wealth per capita began a worryingly steady decline to 2020, falling 3.6% annually on average. Such a long and substantial decline in wealth is unprecedented for a high-income country. It signals unsustainability in Trinidad and Tobago's development trajectory that is not apparent in the country's GDP figures. Real GDP per capita, in contrast, held steady well after 2008, beginning to fall only in 2014. This was a full 5 years after real wealth per capita began its decline. This demonstrates the value of comprehensive wealth as a guide to decision making. It tells important parts of the development story that GDP cannot. In Trinidad and Tobago, comprehensive wealth analysis reveals the extent to which the country's long-term well-being is jeopardized by its over-reliance on fossil fuel wealth.

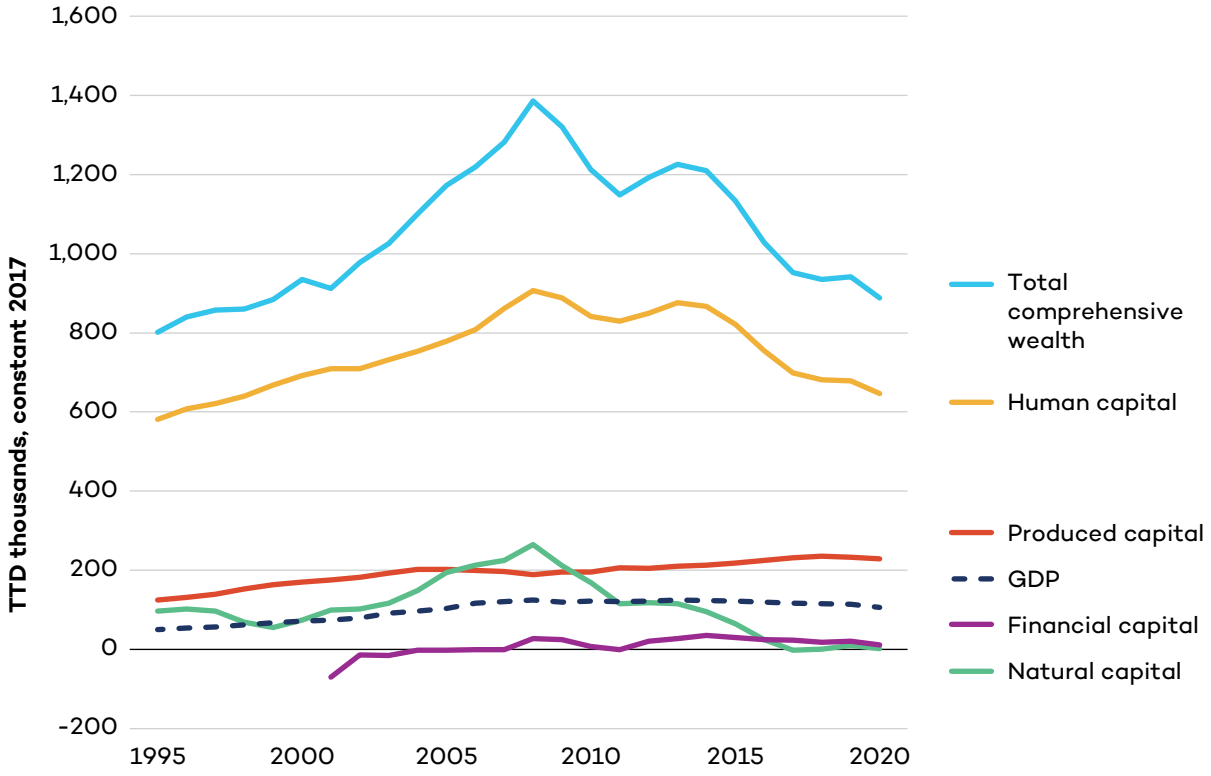
The experience of Trinidad and Tobago highlights the risks associated with overreliance on non-renewable resources like oil and gas for development. The growth of the country's fossil fuel sector has led to excessive investment in the petroleum industry and, therefore, skewing too much of its wealth—human, produced, natural, and financial—in that direction. Investment in non-oil sectors, including agriculture, fishery, and forestry, has received too little attention as a result. It is a classic story of "too many eggs in one basket." This story and its consequences for their country's long-term well-being are not fully clear to Trinidadians and Tobagonians because the news they receive is all about GDP. While the country's GDP story is not rosy in recent years, it is much rosier than that told by comprehensive wealth. The latter points to deep and structural concerns about the sustainability of long-term well-being.

Today, leaders worldwide, including the United Nations Secretary-General, the G7 (Government of Canada, 2019), the Organisation for Economic Co-operation and Development, and the World Economic Forum, are calling on countries to move beyond GDP and start measuring what truly matters for prosperity. The United Nations Secretary-General, in particular, is strongly urging nations to adopt measures of progress that go beyond GDP, recommending comprehensive wealth as one valid approach for doing so. The Secretary-General's endorsement of comprehensive wealth stems from its alignment with

[1] All values in constant TTD in this report use 2017 as the base year. Also, all values in constant USD use 2017 as the base year and the 2017 purchasing power parity (PPP) conversion rate from TTD to USD. The conversion rate is reported by the World Bank (4.16 TTD/USD). Regardless of whether the results are presented in constant TTD or constant USD, the application of the 2017 PPP conversion rate to the entire time series results in identical growth trends.

the attributes of high-quality metrics: conciseness, widespread acceptance, comparability, country ownership, scientific robustness, statistical soundness, and relevance to decision making.

Figure ES1. Per capita comprehensive wealth and GDP



Source: Authors' calculations based on data from national and international sources. National sources: Central Bank of Trinidad and Tobago, Central Statistical Office (CSO), National archive, Ministry of Energy and Energy Industries. International sources: the World Bank, FAOSTAT, Economic Commission for Latin America and the Caribbean (ECLAC).

This study demonstrates—using metrics never before employed in Trinidad and Tobago—just how much the country's reliance on the combination of GDP growth and fossil fuel extraction jeopardizes its long-term well-being. International price shocks have dramatically impacted the value of its fossil fuel assets, driving them to nearly zero in recent years and dragging the value of other key assets—most notably human capital—down with them (Figure ES1). Such dramatic losses of wealth are not sustainable. Moreover, their consequences for well-being are not evident when GDP is used as the sole lens for assessing progress. As a result, Trinidad and Tobago's people and their leaders are not as aware as they should be of the situation they face. An urgent change in the metrics used to guide decision making is called for. Trinidad and Tobago—along with other countries in the region—should begin compiling and using comprehensive wealth measures as part of its decision-making tool kit.

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1.0 Introduction

Trinidad and Tobago is a Caribbean archipelagic nation composed of the two main islands, Trinidad and Tobago, and 21 smaller islands and islets (Convention on Biological Diversity, n.d.). Trinidad is the larger island, with an area of approximately 4,800 km^2. Tobago is only 1/16th the size of Trinidad, with a total area of 300 km2. The country lies close to the continent of South America, northeast of Venezuela and northwest of Guyana. Its total population was 1.367 million in 2020 (Central Statistical Office [CSO], n.d.), and the fact that 54% of its citizens are between the ages of 15 and 49 represents a vital asset for its prosperity.

Trinidad and Tobago benefits from the variety of its biodiversity, the abundance of its resources, and the richness of its culture, all of which make the country a tourist destination. These elements have served as both the economic and social foundation of development for centuries. The attractiveness of the country is reflected by the increasing number of tourists every year. Data from the World Tourism Organization (WTO, n. d) shows that prior to the pandemic, the total number of tourist arrivals increased from 282,000 to 480,000 between 1995 and 2019, a 70% increase.

The country also hosts diverse natural resources. They include mangroves, tropical forests, coral reefs, crude oil, and minerals. The country also hosts the world's largest natural deposit of asphalt, known as the Pitch Lake. The "lake," which is mostly used as a source of material for road building, covers 47 hectares and contains around 6,700,000 tons of asphalt (Watts et al., n.d.).

Like many countries around the world, particularly small island states, Trinidad and Tobago faces sustainability issues, many stemming from the management of its resource wealth. Rapid urbanization is creating pressures on the agricultural sector and overall land use. Despite important contributions to economic growth, oil and gas extraction poses environmental risks. The high dependence of the economy on the petroleum sector is leading to depletion of existing reserves while increasing both the country's vulnerability to market shocks and the effects of climate change.

Addressing the vulnerabilities faced by Trinidad and Tobago is not helped by excessive reliance on growth in market production, or GDP, as the main yardstick for assessing national progress. An ever-growing GDP does not guarantee broadly-based sustainability and well-being. From this standpoint, GDP suffers from excessive focus on short-term market signals, overlooking factors that play key roles in building resilient societies and ensuring well-being of future generations, such as environment, community trust, equality, and investments in education and training. Decision-making that emphasizes GDP growth is, therefore, biased toward short-term gains and not concerned enough about the cost of such gains on other factors affecting well-being.

Today, leaders around the world, including the United Nations Secretary-General, the G7 (Government of Canada, 2019), the Organisation for Economic Co-operation and Development (2018), and the World Economic Forum (Schwab, 2019), are increasingly

calling to move beyond GDP and start measuring what truly matters for prosperity. The United Nations Secretary-General, in particular, is strongly urging nations to adopt measures of progress that go beyond GDP, and one measure he recommends is comprehensive wealth, i.e., the sum of human, natural, social, produced, and financial capital. The Secretary-General's endorsement of comprehensive wealth as one of several measures that could credibly sit alongside GDP stems from its alignment with the attributes of high-quality metrics: conciseness; widespread acceptance; comparability; country ownership, scientific robustness, statistical soundness, and relevance to decision making.

Drawing on research for Canada by the International Institute for Sustainable Development,[2] this report presents findings from a ground-breaking project to estimate comprehensive wealth for Trinidad and Tobago. The estimation used national data sources and adapted the methodology used in the Canadian report, following as closely as possible the methods of the World Bank (2021). The insights drawn from the results underscore the need for Trinidad and Tobago (and other countries) to look beyond GDP by compiling comprehensive wealth measures and using them to guide decision making. The report emphasizes that policy-makers should be using comprehensive wealth measures alongside GDP and other traditional indicators to inform decision making. Doing so would balance decision making over the short and long terms while also ensuring that all determinants of well-being—environmental, social, and economic—are given full consideration.

[2] Initially implemented in Canada in 2016 (Smith et al., 2016) and 2018 (Smith et al., 2018), IISD's comprehensive wealth project currently covers Ethiopia, Indonesia, and Trinidad and Tobago (see International Institute for Sustainable Development, n.d.).

2.0 Comprehensive Wealth: Rationale and importance

There are several reasons why GDP fails to measure true progress. Environmental degradation, voluntarism and other unpaid work, increasing levels of debt, and growing time stress for families are all missing in GDP statistics. These and other concerns about GDP are increasingly evident to leaders worldwide, who are beginning to realize that GDP fails to capture much of what matters for the well-being of their citizens, especially in the long run. A nation's comprehensive wealth portfolio, on the other hand, determines the prospects for citizens' well-being since the assets that constitute the portfolio are the basis for producing nearly all goods and services that people require to prosper: food, electricity, housing, infrastructure, clean air, healthy forests, and safe communities. The five elements of every nation's comprehensive wealth portfolio are listed below. Each country has a different endowment of each type of capital, and the composition of its portfolio can and will change over time. The way countries manage their portfolios and, especially, how they combine the various types of capital to produce goods and services—both within and outside the market—matters a great deal in determining people's well-being. Types of capital include the following:

- **produced capital**, which consists of roads, railways, ports, houses, machinery, and other manufactured assets;
- **natural capital**, which includes marketable natural resources such as timber, minerals, oil, and gas, and non-market ecosystems, such as wetlands, mangrove swamps, and forests;
- **human capital**, which comprises the collective knowledge, skills, and capabilities of the labour force—the result of lifelong learning in both formal and informal settings;
- **financial capital**, which includes direct investment, bank deposits, stocks, bonds, and other forms of financial assets and liabilities;
- **social capital**, which represents the norms and behaviours that structure and support productive interactions between members of society, including safety, inclusivity, and trust in institutions.

The consumption of the goods and services produced by combining the various types of capital is an important driver of well-being for individuals and for nations as a whole, as consumption of goods and services accounts for a great deal of what matters to people: nourishment, shelter, safety, health, leisure, and many other forms of self-fulfillment. Note that "consumption" includes enjoyment of goods and services that are freely available—such as a walk in a forest or a swim in a lake—just as much as it includes enjoyment of goods and services that must be bought.

When a nation's comprehensive wealth portfolio is constant or expanding in per capita terms, national development—understood as continued opportunities for market and non-market production and consumption—is likely sustainable. Under such conditions, the well-being of both current and future citizens should be stable or increasing. On the other hand, if wealth is

stagnating (or worse, declining), development is on an unsustainable path and well-being will decline at some point.

For these reasons, measures of comprehensive wealth are understood to be crucial to assessing societal progress.[3] As Cambridge Professor Sir Partha Dasgupta recently put it, "in order to judge whether the path of economic development [nations] choose to follow is sustainable, [they] need to adopt a system of economic accounts that records [a comprehensive] measure of their wealth" (2021, p. 5). Thus, decision-makers need to begin focusing equally (if not more) on the assets that underpin well-being in the long run.

Moving beyond GDP does not mean replacing it entirely but rather complementing it with indicators that are better suited to measuring the sustainability of well-being. What the world needs to move beyond is excessive and blinkered reliance on GDP as a measure of progress, not the measure itself. GDP will remain of use since what it measures, national income, is important. Complementing GDP with comprehensive wealth measures would, however, bring much-needed balance to decision making: balance between short- and long-term policies; between the economy, nature, and society; and between market and non-market outcomes. Such balance is urgently needed today.

[3] See, for example, Arrow et al. (2012); Dasgupta (2001, 2012, 2014, 2021); Dasgupta and Mäler (2000); Hamilton and Clemens (1999); Kurniawan and Managi (2018); Managi and Kumar (2018); Polasky et al. (2015); Smith et al, (2016 & 2018); UNU–IHDP and UNEP (2012 and 2014); World Bank (2006, 2011, 2018, & 2021); Zenghelis et al. (2020).

3.0 Findings

This section discusses key findings from the study. We also summarize the methodology adopted, the data sources used, and the approaches to overcoming the challenges we met in compiling the figures.[4] The results encompass both monetary and non-monetary figures. This reflects the fact that some assets can be readily valued (human capital, produced capital, market natural capital,[5] and financial capital) while others cannot (non-market natural capital and social capital). Total comprehensive wealth is the arithmetic sum of the monetary measures; namely, produced capital, market natural capital, human capital, and financial capital. Non-monetary wealth is presented separately and includes non-market natural capital and social capital. All monetary assets are presented in per capita and inflation-adjusted terms to account for population and price effects.

3.1 Overall Comprehensive Wealth in Trinidad and Tobago

3.1.1 Monetary Measures

The components of Trinidad and Tobago's comprehensive wealth that could be measured in monetary terms[6] showed uneven, but generally weak, growth over the study period (1995–2020). Real comprehensive wealth per capita grew at an average rate of 4.3% annually from 1995 until the 2008 global recession (Figure 1).[7] From 2008 to 2020, it declined by an average of 3.6%. This resulted in an average annual growth rate of just 0.6% (Figure 1) over the study period. The decline of real per capita wealth since 2008 is especially worrisome, as it signals an unsustainable trend in well-being for the country.

The story of comprehensive wealth in Trinidad and Tobago contrasts strongly with that provided by GDP. Real per capita GDP increased from TTD 49,786 (USD 11,962) in 1995 to TTD 105,570 (USD 25,365) by 2020 (Figure 1). The average annual growth of real per capita GDP over the period 1995–2020 was 3%, much stronger than the 0.6% annual average growth in real per capita wealth over the same period. Like per capita comprehensive wealth, real per capita GDP peaked in 2008. However, it remained more or less stable following its peak until beginning a steady decline in 2013. Comprehensive wealth began this decline immediately after 2008, however, and declined much further than GDP. By 2020, real comprehensive wealth per capita was a full 36% below its 2008 value. Real GDP per capita had fallen by only 15%.

[4] Appendix A details the methods and data sources used in the study. Appendix B presents detailed results (monetary values only).

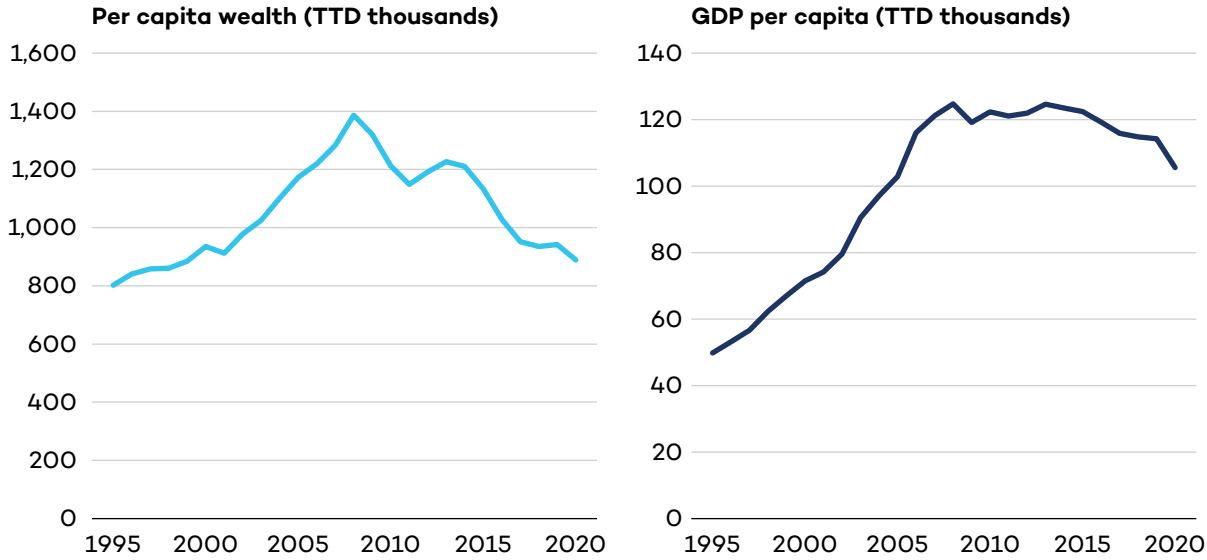
[5] Market natural capital includes natural resources that can be extracted and sold in markets (for example, fossil fuel reserves, mineral deposits and timber stands) plus certain ecosystem functions for which market-equivalent prices can be estimated.

[6] Human capital, financial capital, produced capital, fossil fuel assets and agricultural land.

[7] Financial capital is omitted for the period 1995–2000 due to lack of data. This exclusion does little to skew the overall results, given that financial capital contributes less than 2% to total wealth.

This raises concerns about the use of GDP to judge national progress. GDP figures suggest an overall positive trajectory for the country since 1995, though with a downturn beginning in 2013. Comprehensive wealth, on the other hand, suggests that the country progressed very little, with the average inhabitant having essentially the same level of wealth in 2020 as they had in the mid-1990s. The 36% decline in comprehensive wealth since 2008 is a particular worry, since it is wealth and not GDP that determines the country's capacity to generate well-being in the long term. Not only is this decline much more significant than the accompanying decline in real GDP per capita (15%), it began 5 years earlier. Had decision-makers and the public in Trinidad and Tobago focused on trends in comprehensive wealth rather than GDP, concerns for the country's sustainability might have been raised earlier and more loudly.

Figure 1. GDP and comprehensive wealth per capita – Trinidad and Tobago



Source: Authors' calculations based on data from national and international sources. National sources: Central Bank of Trinidad and Tobago, CSO, National Archive, Ministry of Energy and Energy Industries. International sources: the World Bank, FAOSTAT, ECLAC.

3.1.2 Non-Monetary Measures

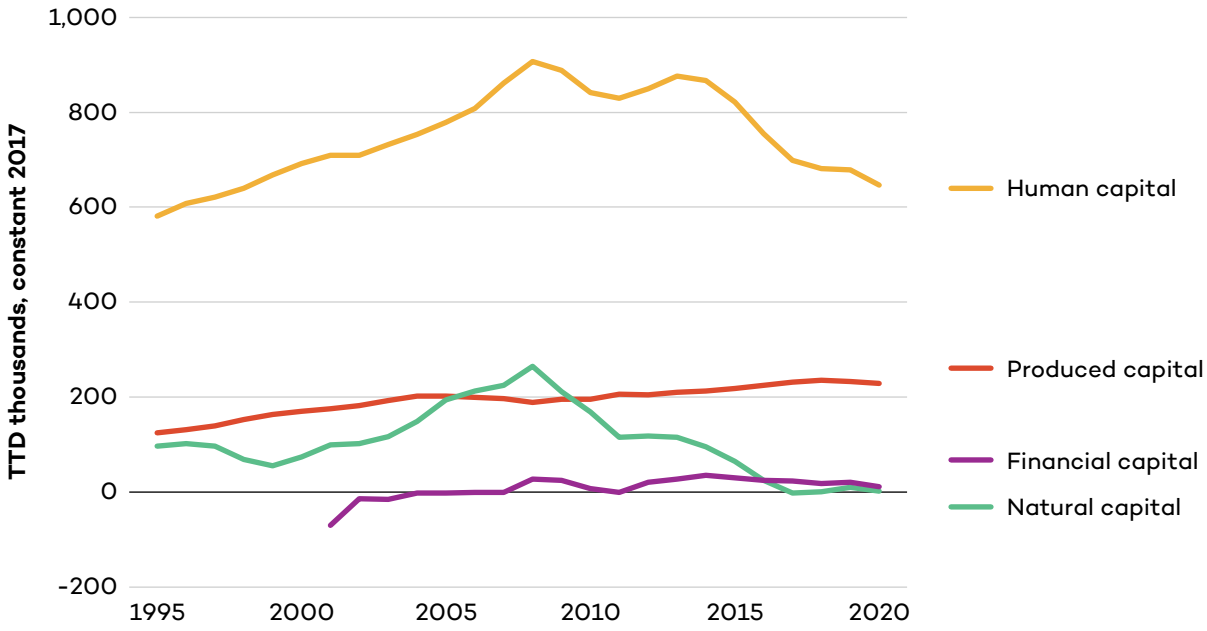
The elements of the comprehensive wealth that could not be measured in monetary terms are also a source of concern. Total forest area declined by roughly 6% over the period, though the area of mangrove forests remained largely unchanged over the period. Evidence suggests that the country is getting warmer and drier as time passes. Finally, Trinidad and Tobago scores high on only three of eight measures of social capital.

3.2 Detailed Findings

The 2008 global crisis was a significant turning point for Trinidad and Tobago's economy. Except for produced capital, all assets showed growth to 2008 followed by substantial declines afterward. Human capital is the predominant component, representing around three-quarters of total wealth. This is consistent with findings around the world, where human capital is

almost always the most significant component of comprehensive wealth. Produced capital is the only asset that consistently grew over time. From TTD 124,937 (USD 30,015) in 1995, its value nearly doubled to TTD 229,247 (USD 55,075) in 2020, reflecting an average annual growth rate of 3%. Market natural capital, which is mainly driven by fossil fuel assets— the backbone of the Trinidad and Tobago economy—experienced the sharpest decline. From TTD 95,910 (USD 23,042) in 1995, market natural capital declined by 5% on average each year. In 2020, the value of the asset was estimated at nearly zero (TTD 1,743, or USD 419). This translates to a loss of nearly 98% of natural capital value over the study's timeframe (Figure 2).

Figure 2. Wealth components over time



Source: Authors' calculations based on data from national and international sources. National sources: Central Bank of Trinidad and Tobago, CSO, National Archive, Ministry of Energy and Energy Industries. International sources: the World Bank, FAOSTAT, ECLAC.

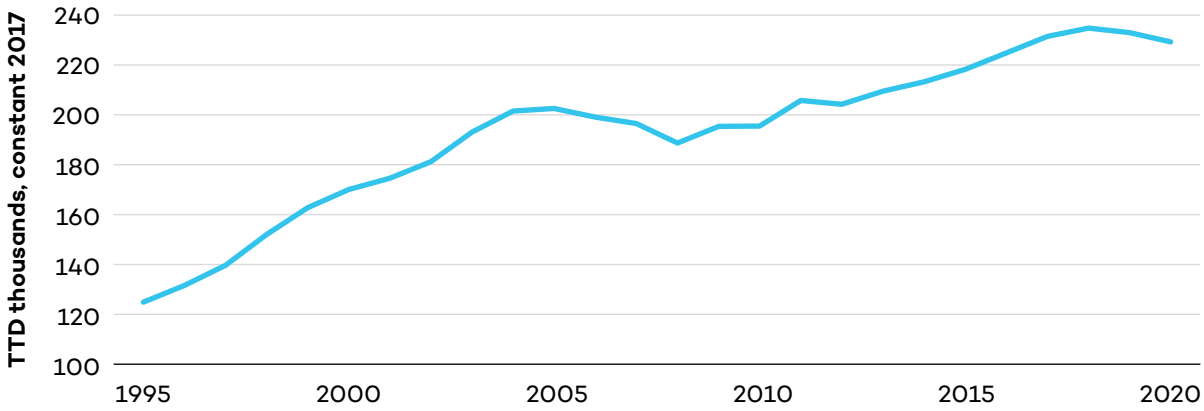
3.3 Produced Capital

As a small island state, physical capital plays a vital role in Trinidad and Tobago. With more than 9,000 km of roads throughout the country, the road network in Trinidad and Tobago has expanded significantly in the last two decades. This reflects the nation's commitment to bolster socioeconomic development through infrastructure and increased access to communities, particularly in non-urban areas. Over the years, marine transport equipment and related infrastructure have expanded considerably to support passenger and cargo movement between the islands. As part of the country's efforts to boost tourism, TTD 1.2 billion has been allocated for the expansion of the A.N.R. Robinson Airport in Tobago (Ghouralal, 2020). Infrastructure such as roadways, dams, and electric generation equipment is critical to well-being and livelihood. Assessing the level and trends in these assets is important since they

contribute significantly to the generation of goods and services for domestic and international markets, as well as to building resilience to natural disasters.

Figure 3 shows that Trinidad and Tobago experienced steady growth (other than the period around 2008) in the real value of produced capital per capita, from TTD 124,937 (USD 30,015) in 1995 to TTD 229,247 (USD 55,075), corresponding to an overall increase of 83% and average annual growth of 3%. The oil booms of the 1970s and 2000s and its positive impacts on rents and government revenues facilitated substantial investments in produced capital, resulting in the upward trend seen in Figure 3.

Figure 3. Produced capital per capita



Source: Authors' calculations based on data from Central Bank of Trinidad and Tobago, CSO, National Archive[8] and United Nations ECLAC.

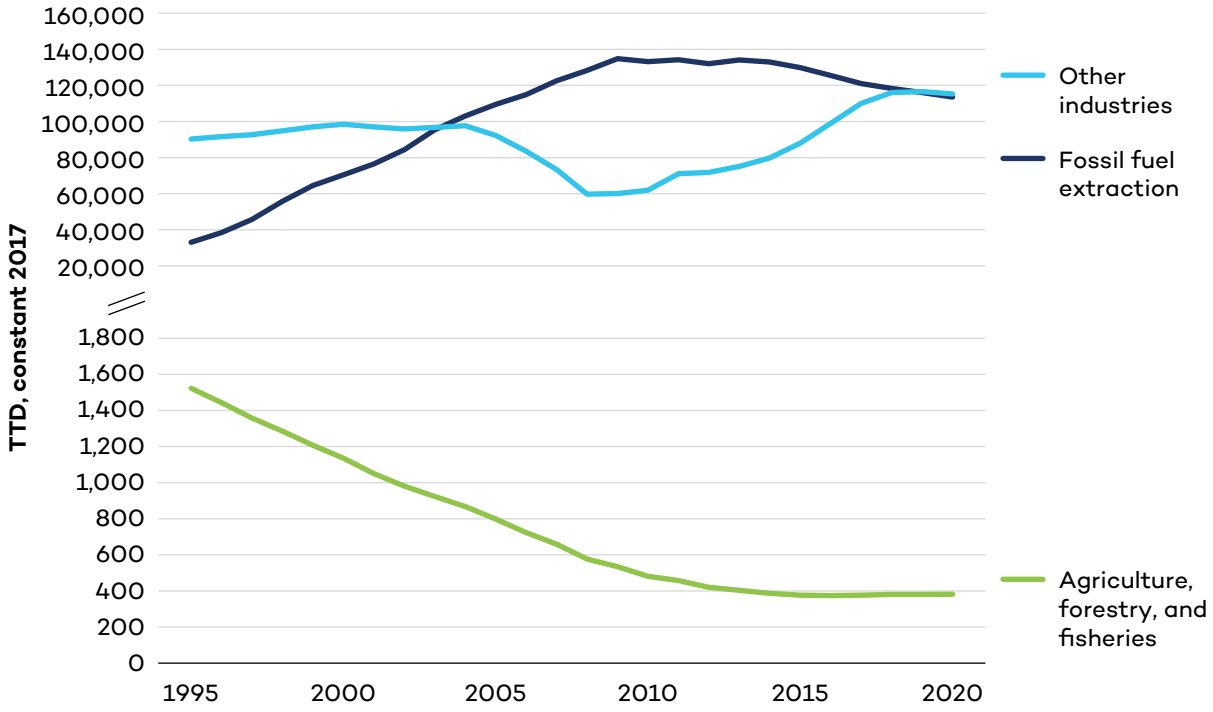
Looking at the sectoral distribution of produced capital, Figure 4 shows a decline in real per capita produced capital in the agriculture industry, particularly before 2012. Over the study period, per capita produced capital of the agriculture sector decreased from TTD 1,523 (USD 366) to TTD 382 (USD 92), corresponding to a total decline of 75% or an average decline of 5% annually. This decline paralleled the decline of Trinidad and Tobago's sugar plantation industry, which culminated with the closure of the giant sugar producer Caroni in 2003 after periods of billion-dollar losses. The closure of smaller sugar refinery operations at other sites followed shortly thereafter, as well as spin-off declines in citrus production and processing.

At the same time as produced capital in the agriculture sector was declining, the value of real per capita produced capital used in oil and gas extraction was increasing dramatically, rising from TTD 33,079 (USD 7,947) in 1995 to TTD 134,797 (USD 32,384) in 2009 before beginning to decline on average by 1.5% annually to finally reach TTD 113,528 (USD 27,274) in 2020 (Figure 4). This decline was due to a combination of two factors. First, there was a slowdown in investment in the oil and gas extraction industry during this period due to a decline in production. Second, inflation in the country ran at historically high rates from 2006 to 2012.

[8] Data from the Trinidad and Tobago National Archive was obtained through in-person visits.

The opposite paths taken by produced capital in the fossil fuel and agriculture industries aligns with the concept of so-called "Dutch Disease" (Apergis et al., 2014). According to this concept, a boom in the oil sector can lead to contraction of the agriculture sector. Due to structural changes in the economy, agriculture receives lower priority for investment.

Figure 4. Produced capital per capita by sector



Source: Authors' calculations based on data from Central Bank of Trinidad and Tobago, CSO, National Archive and FAOSTAT.

3.4 Natural Capital

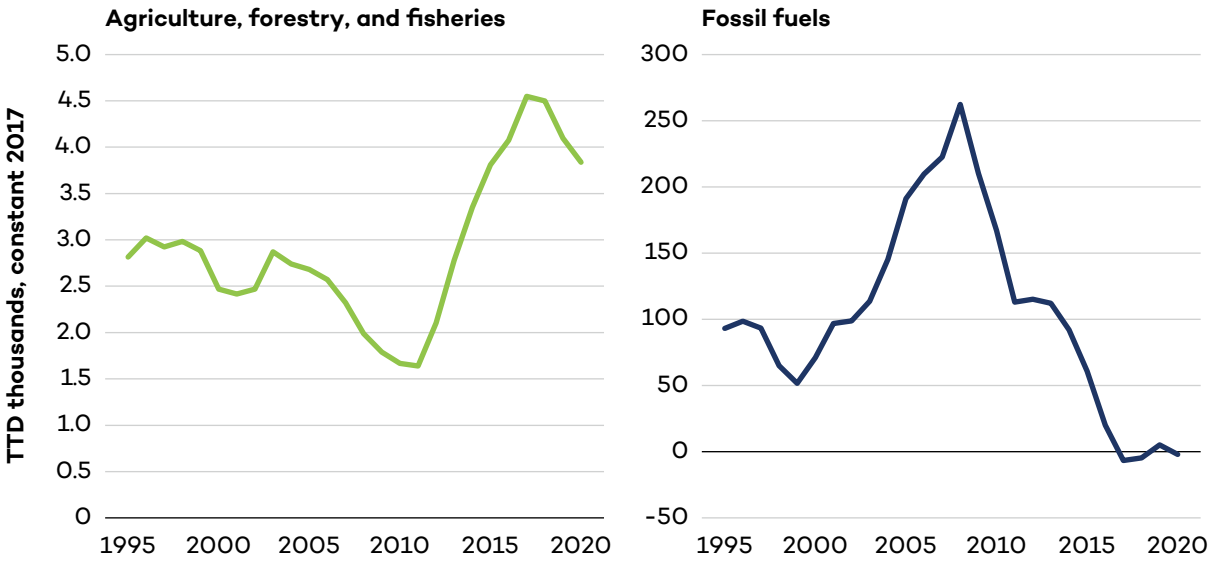
Trinidad and Tobago recognizes the need to protect and effectively manage its natural resources in efforts to achieve environmental sustainability. For instance, the Climate Change Policy introduced in 2011 was formulated based on global considerations regarding the effects of climate change on the environment and humanity. The projected impacts of climate change in the country, and in the Caribbean region more generally, include increased temperatures; extreme weather events, such as hurricanes, floods, droughts and storms; increases in sea surface temperatures; a rise in sea levels; and the expectation of an overall decrease in rainfall (Government of the Republic of Trinidad and Tobago, 2011). Trinidad and Tobago has banned any form of construction on or beyond the 300-foot contour line of the Northern Range to mitigate the occurrences of landslides in the area (Ministry of Planning and the Economy, 2012). Restoration and reforestation projects have been undertaken to replenish forest reserves that were previously lost through human-made fires and rising temperatures associated with climate change. These reforestation projects aim to restore 40 hectares of abandoned or exhausted quarry pits throughout north-eastern Trinidad (Ministry of Planning and Development, 2019).

The government, private sector, and various civil society organizations recognize the questions around the viability of a national economy that is overly dependent on oil and gas extraction. Given this, understanding and quantifying the value of natural assets can be an important guide for effective financing and long-term sustainability. It would help inform better decision-making, ensure that the country's resources are used efficiently and sustainably, and that future generations' well-being is not jeopardized.

3.4.1 Findings – Market natural capital

Figure 5 presents both real fossil fuel[9] and agricultural, forestry, and fisheries (AFF)[10] wealth per capita. The trend is dominated by the value of oil and gas assets, with AFF assets worth only a small fraction of the total (less than 5% on average). Trinidad and Tobago experienced continuous growth in the real value of its per capita fossil fuel assets up to the 2008 global recession. Between 1995 and 2008, fossil fuel wealth per capita nearly tripled, increasing from TTD 93,097 (USD 22,366) to TTD 262,214 (USD 62,995). However, following 2008, the value rapidly declined to the point where those vital resources were worth essentially nothing. This startling loss in wealth was the result of multiple factors, including lower international oil prices and demand during the post-2008 recession period and the contraction of Trinidad and Tobago's oil sector due to depleting reserves. From 1995 to 2020, the remaining lifetime of the country's reserves dropped from 42 years to 9 years. Total production peaked at just under 43 million tonnes of oil equivalent (TOE) in 2010. By 2020, it had declined to 29.6 million TOE.

Figure 5. Market natural capital per capita



Source: Authors' calculations based on data from Central Bank of Trinidad and Tobago, CSO, National Archive, and Ministry of Energy and Energy Industries

[9] Note that here we are referring to the value of the oil and gas reserves themselves (that is, the in situ natural resources) and not to the value of the produced capital used to extract those reserves. The latter was the subject of the preceding discussion.

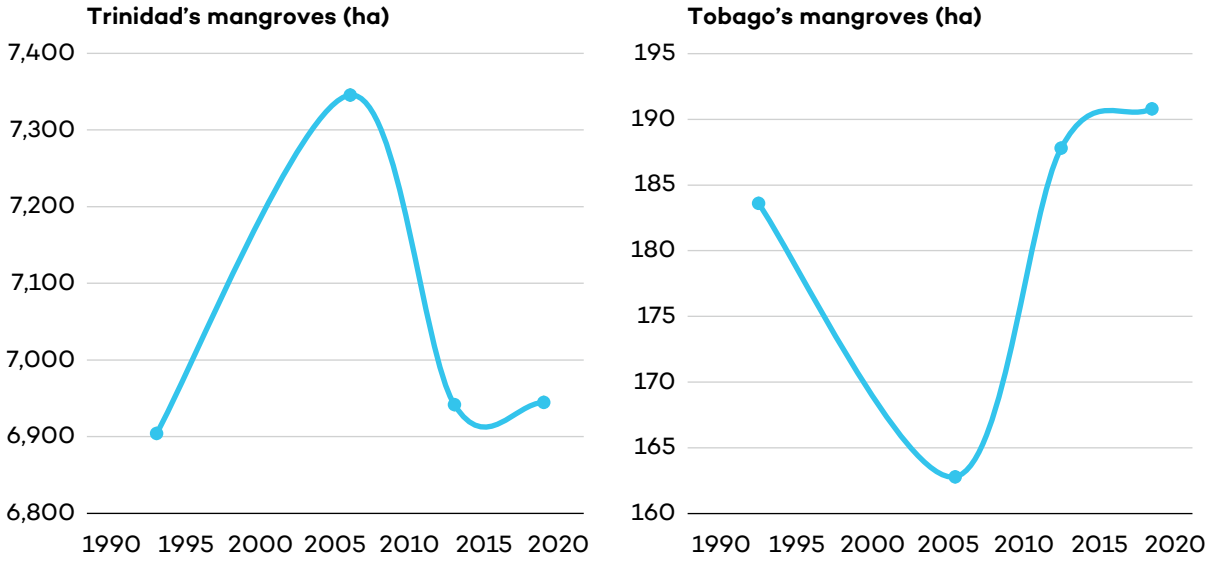
[10] This is the implicit value of farmland, forestland and fisheries based on the rent earned by businesses and individuals engaged in agriculture, timber harvesting and fishing.

3.4.2 Findings – Non-market natural capital

Mangroves

From 1993[11] to 2006, total mangrove area on the island of Trinidad increased by 6.4%, from 6,904 ha to 7,345 ha, while on the island of Tobago it decreased by 11% (from 183.6 ha to 162.8 ha) (Figure 6). However, these trends reversed after 2006: Trinidad experienced a 5.5% decline in its total mangrove area up to 2019, while Tobago saw a 17.2% increase in its coverage. From 2013 to 2019, mangrove areas on both islands remained almost constant. With damages to infrastructure from tropical storms—including the direct effects derived from them, such as coastal flooding, wind, and rainfall—estimated to reach USD 37 million annually (Inter-American Development Bank, 2014) or around USD 24 per capita, the expansion of mangroves should be given close consideration to mitigate these costs.

Figure 6. Extent of mangrove area



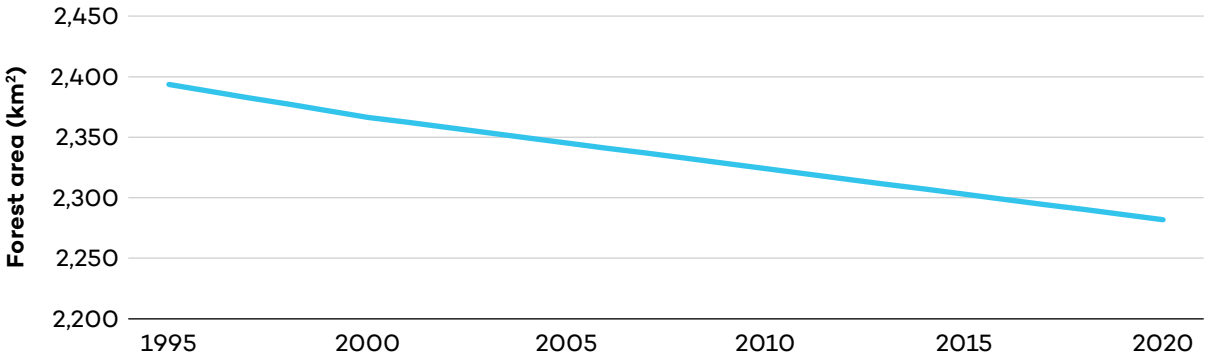
Source: Data from Institute of Marine Affairs, Trinidad and Tobago, n.d.

Forests

Figure 7 shows that total forest area is in decline in Trinidad and Tobago. In 1995, forest area was estimated at 2,394 km^2. In 2020, the area had been reduced to 2,281 km2, marking a 4.7% decline over the period. This downward pressure on forests, although smaller than the Latin America and Caribbean average of 13% (World Bank, n.d.), carries important consequences for biodiversity, climate regulation, and nature-based tourism. All these are important elements of both the current and future generations' prosperity.

[11] Mangrove extent data are available only for 1993, 2006, 2013, and 2019.

Figure 7. Forest area

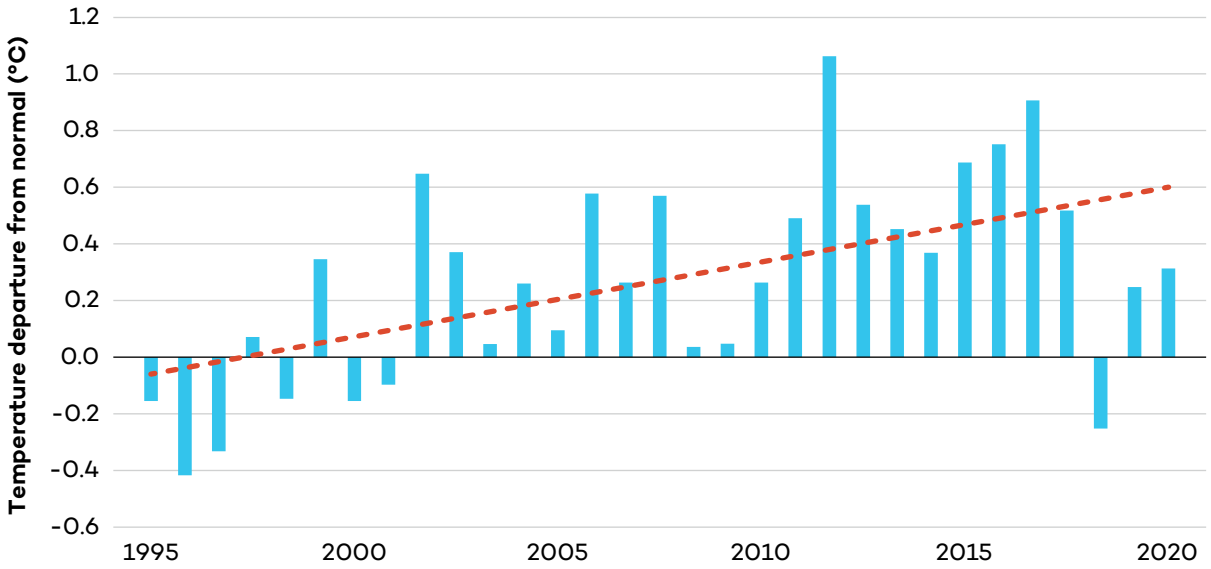


Source: Data from World Bank, n.d.

Climate

Like all countries, Trinidad and Tobago is experiencing the effect of global warming (Figure 8). In 2020, the average temperature was 0.3°C above the normal for the period 1981–2010. The country has experienced years with significantly higher temperatures, such as 2010 and 2016, when the average annual temperature rose by around 1°C above the normal.

Figure 8. Temperature departure from normal – national

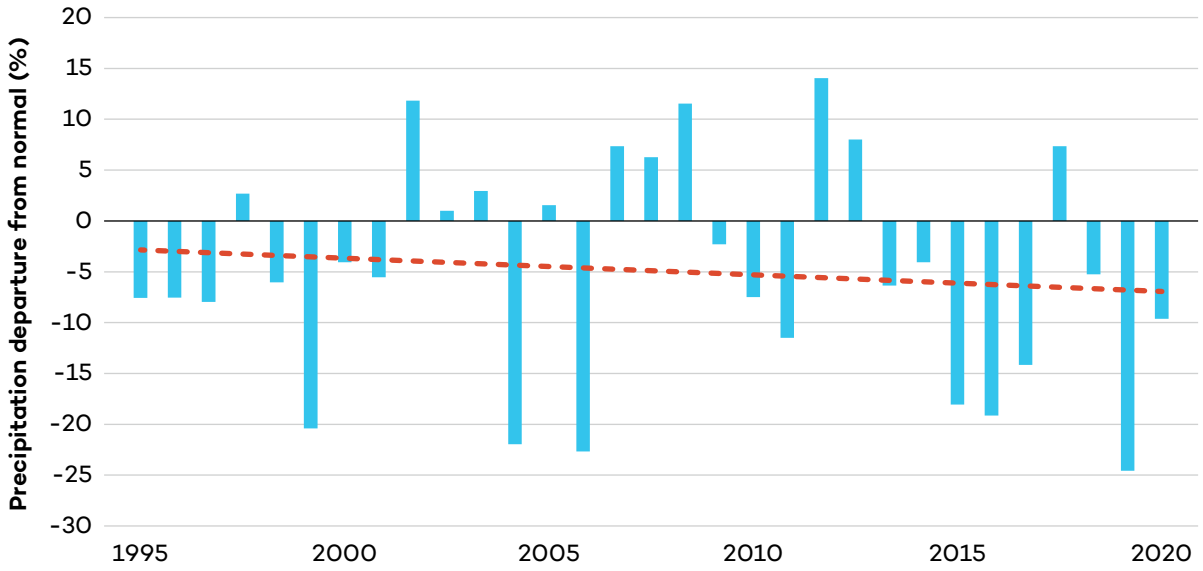


Source: Authors' calculations based on data from Trinidad and Tobago meteorological service.

Precipitation, on the other hand, has been decreasing over time (Figure 9). The Trinidad and Tobago Meteorological Service (n.d.) notes, however, that changes in rainfall are not consistent across different parts of the country. Penal, in the southern part of Trinidad, for instance, has showed decreasing rainfall in recent years, while Piarco, in the northern part, has become wetter. The declining precipitation is partly explained by strong El Niño events that have extended the length and intensity of dry seasons. Together, the data in Figures 9

and 10 provide evidence that Trinidad and Tobago is getting warmer and dryer. These two phenomena have important negative consequences for sectors like agriculture.

Figure 9. Precipitation departure from normal



Source: Authors' calculations based on data from Trinidad and Tobago meteorological service.

3.5 Human Capital

Human capital consists of the knowledge and skills that individuals accumulate over their lifetimes. It includes cognitive skills as well as non-cognitive skills, such as intra- and inter-personal abilities.[12] Healthy and educated citizens are productive and innovative and thereby play an important role in driving prosperity.

Since gaining independence in 1962, Trinidad and Tobago has climbed into the ranks of the countries considered "high-income" by the World Bank. It has an infant mortality rate that is among the lowest in the region (6.5 per 1,000 live births). Its literacy rate is around 99%, and 65% of the population participates in tertiary education (United Nations, 2021). Though gaps remain in gender equality, women play an important role in political debate, occupying 26% of the seats in the lower house of Parliament and 40% of the seats in the Senate. According to the United Nations (2021), one reason for these successes is the country's significant investment in human capital driven largely by the revenues from its fossil fuel resources.

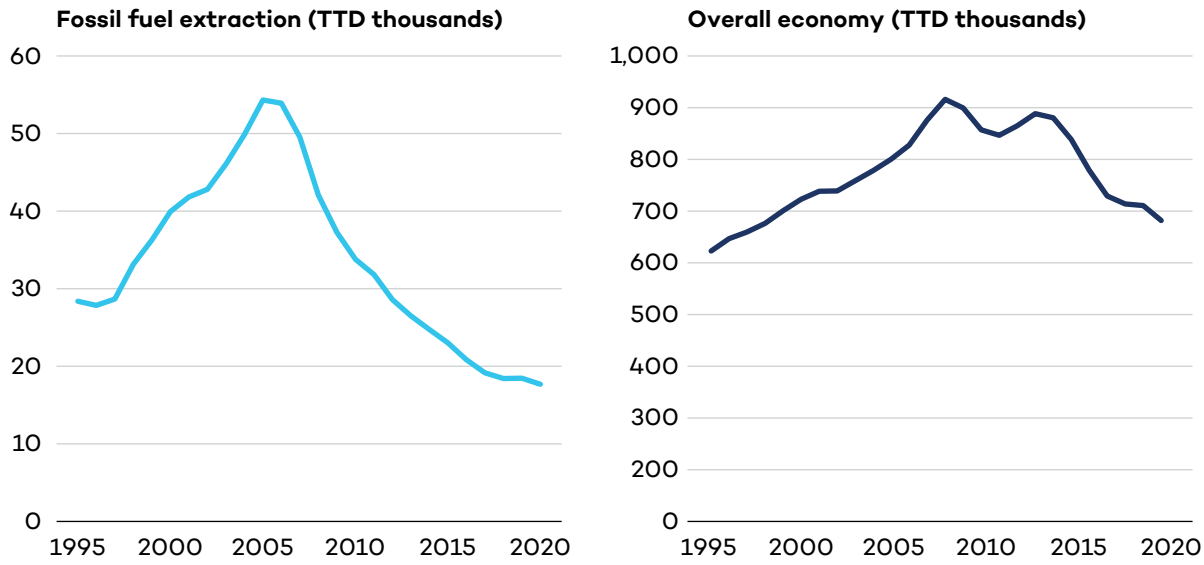
Figure 10 shows that real human capital per capita consistently increased from around TTD 580,600 (USD 139,477) in 1995 to a peak of around TTD 906,500 (USD 217,779) in 2008. This corresponds to a 56% increase in less than 15 years. After 2008, however, human capital began to decline, falling to TTD 646,509 (USD 155,319) in 2020—a 29% decrease from its peak. This is a disturbing trend for the country, signalling concerns about the sustainability

[12] Examples of intra-personal abilities include self-esteem, composure, and resilience. Examples of interpersonal abilities are teamwork, leadership, and effective communication.

of well-being. Given the importance that human capital plays in development, no country can afford to see its average human capital decline in real terms over an extended period. In Trinidad and Tobago, it has declined more or less steadily for over a decade. Real human capital per capita ended the period only 11% higher than it had been 25 years earlier in 1995, despite the substantial investments in education made during that time.

The human capital employed in the fossil fuel sector experienced an even more concerning trend. Its value almost doubled in real per capita terms to 2005 but then began a steady decline all the way to 2020, ending up 38% below what it had been in 1995. The expansion of fossil fuel extraction and high prices before the 2008 global recession generated jobs and important revenues for the country. Following the recession, some of the human capital accumulated prior to the recession was lost due to declining production, job cuts, and shrinking fiscal space. With human capital in the country's most important industry declining so much, those concerned with its long-term well-being should be alarmed.

Figure 10. Human capital per capita



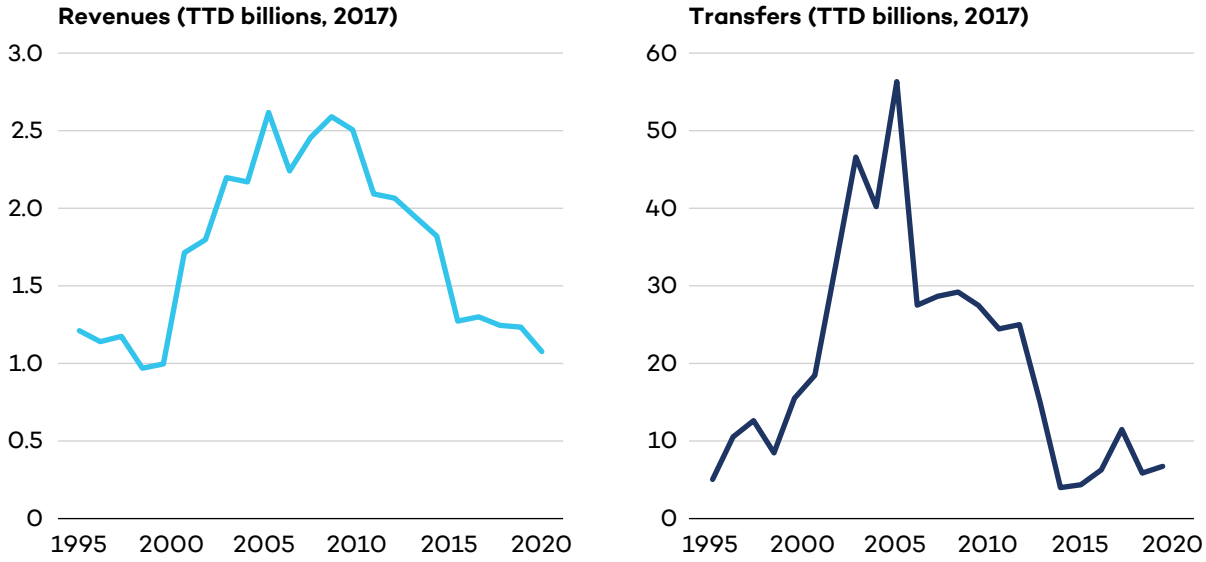
Source: Authors' calculation based on data from CSO and Central Bank of Trinidad and Tobago.

Figure 11 illustrates how investment in education in Trinidad and Tobago is dependent on oil revenues. Up to 2008, public transfers to the education sector—which include grants to primary and secondary schools, tertiary institutions, technological centres, and research institutions[13]—consistently increased as oil revenues increased. From 1998[14] to 2007, real transfers to education increased from around TTD 12.1 billion to TTD 26.2 billion, corresponding to a 116% increase. The fall in fossil fuel revenues after 2008 was subsequently followed by a decline in transfers to the education sector. In 2020, the value of the transfer was just more than $TT1 billion, 11% lower than it had been in 1998 but 58% below its peak in 2010.

[13] Central Bank of Trinidad and Tobago (n.d.).

[14] Data for the period 1995–1997 were not available for these variables.

Figure 11. Fossil fuel revenues and transfers to the education sector



Source: Data from CSO, Trinidad and Tobago, Public Finance Fiscal database: https://www.central-bank.org.tt/statistics/data-centre/public-finance-fiscal.

Note: Both series were deflated using the Consumer Price Index, with 2017 as the base year.

3.6 Financial Capital

Financial capital comprises financial assets and liabilities. More specifically, it encompasses the foreign financial assets owned by residents of one country (assets) and the domestic financial assets in that same country owned by non-residents (liabilities). According to the System of National Accounts (United Nations Statistics Division (2008), financial assets[15] consist of all financial claims, shares, or other equity in corporations plus gold bullion held by monetary authorities as a reserve asset. Financial liabilities, the counterparts of assets, are established when one unit (the debtor) is obliged, under specific circumstances, to provide a payment or series of payments to another unit (the creditor).

Financial capital represents another store of wealth a country can use to support its well-being and development. Trinidad and Tobago's energy sector is the main determinant of the country's financial capital through foreign direct investment in energy projects, portfolio investment in energy companies, and other investments, such as loans and trade credits. The energy sector also contributes to financial capital through earnings of foreign exchange from exports of energy products, which allows payment for the imports of goods and services and repayment of the country's foreign debt.

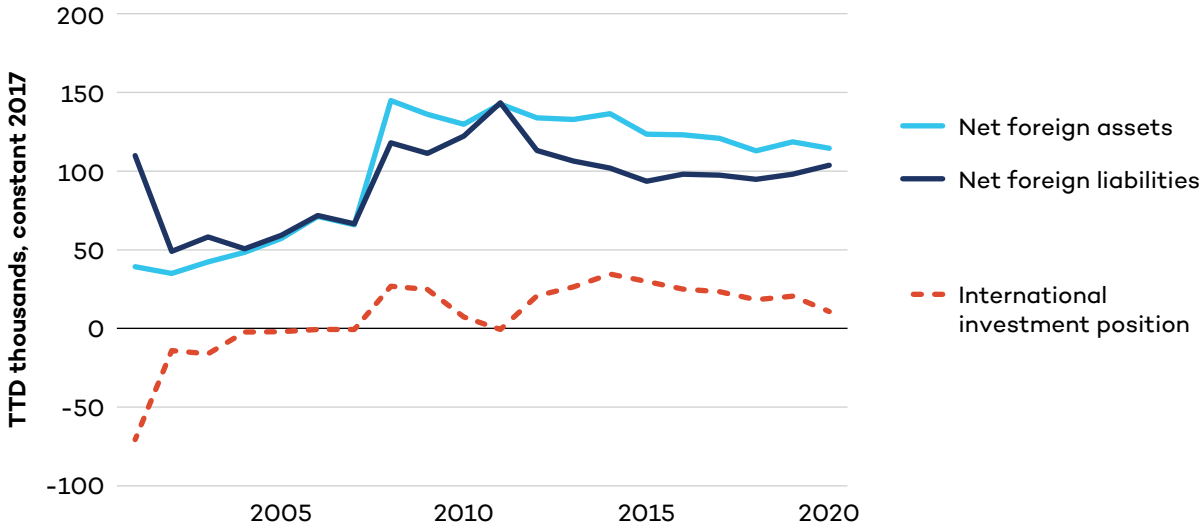
Trinidad and Tobago's real per capita financial capital (that is, its foreign financial assets, foreign financial liabilities, and the difference between the two, i.e., the country's net "international investment position" [IIP]) are depicted in Figure 12.[16] The IIP was negative

[15] Assets can also be seen as stores of values that give rights to their owner to derive financial benefits by carrying or using them over a certain time.

[16] Data on the IIP are not available prior to 2001.

up to 2007, indicating that there were more domestic financial assets being held by foreigners than foreign assets held by residents; the country was a debtor nation during those years. However, at the end of December 2008, the IIP registered a notable increase to TTD 26,817 (USD 6,442). This significant jump and change in position from debtor to lender nation is largely explained by increased holdings of foreign financial assets due to the creation of the Heritage and Stabilisation Fund (HSF) in March 2007 (Ministry of Finance, n.d.) (see below for more details on this fund). After 2007, IIP remained positive in all years until 2020, except in 2011, when the value dropped just below zero. The country's IIP peaked in 2014 at TTD 34,600 (USD 8,300) per capita.

Figure 12. Assets, liabilities, and financial capital per capita



Source: Authors' calculation based on data from Central Bank of Trinidad Tobago

Financial Capital and the Role of the Heritage and Stabilisation Fund

The HSF has played an important role in driving the value of foreign financial asset holdings and, consequently, the country's IIP. The HSF's primary functions are 1) stabilization of government revenues by providing a fiscal safety net in the event of fluctuations in fossil fuel revenues and 2) savings for future generations (Ministry of Finance, 2020). Although the fund is owned by the government, it is managed by a separate board that operates under clear rules related to deposits and withdrawals. The act governing the HSF was amended in 2020 to permit withdrawals in disasters declared under the Disaster Measures Act, dangerous infectious disease outbreaks declared under a Public Health Ordinance, or when there is or is likely to be a precipitous decline in budget revenues that heavily rely on oil/gas reserves and prices (Ministry of Finance, 2020). The HSF is exclusively invested in foreign currency-denominated assets with a medium to long-term focus. In 2020, the total allocation of assets under management included (Corporate Finance Institute, n.d.)

- **U.S. fixed-income assets** (39.97%) include securitized investments and corporate credit.

- **U.S. equity assets** (21.61%), with significant investments in financial services, technology, and consumer durables.
- **U.S. short-duration fixed-income assets** (20.78%), including allocations to "spread" products such as agency securities.
- **Non-U.S. international equity assets** (17.65%), including investments in the United Kingdom, Europe, and Japan.

The HSF's value stood at USD 5.7 billion in 2020, having grown from USD 1.8 billion in 2007. From 2007 to 2020, withdrawals were made in 4 years (2016, 2017, and 2020), totalling about USD 1.6 billion.

3.7 Social Capital

Social capital is defined as the set of assets that contribute to shaping our daily lives, such as goodwill, fellowship, sympathy, and social intercourse among individuals and families (Keeley, 2007). The Organisation for Economic Co-operation and Development defines social capital as "networks together with shared norms, values, and understandings that facilitate co-operation within or among groups." The concept stems from the realization that social networks, institutions, shared values, trust, and participation, are vital components of a well-functioning society (Coleman, 1988). By impacting legislation, governing systems, norms, values, the size and quality of networks among citizens, social capital plays an important role in driving well-being, just as human, produced, natural, and financial capital. Durston (1999) notes that stable relationships based on values such as norms and cooperation can reduce transaction costs, scale up the production of public goods and facilitate the constitution of sound civil societies. For small islands like Trinidad and Tobago, social capital is even more vital in the context of climate change, as it promotes the capacity of communities to cope with disaster.

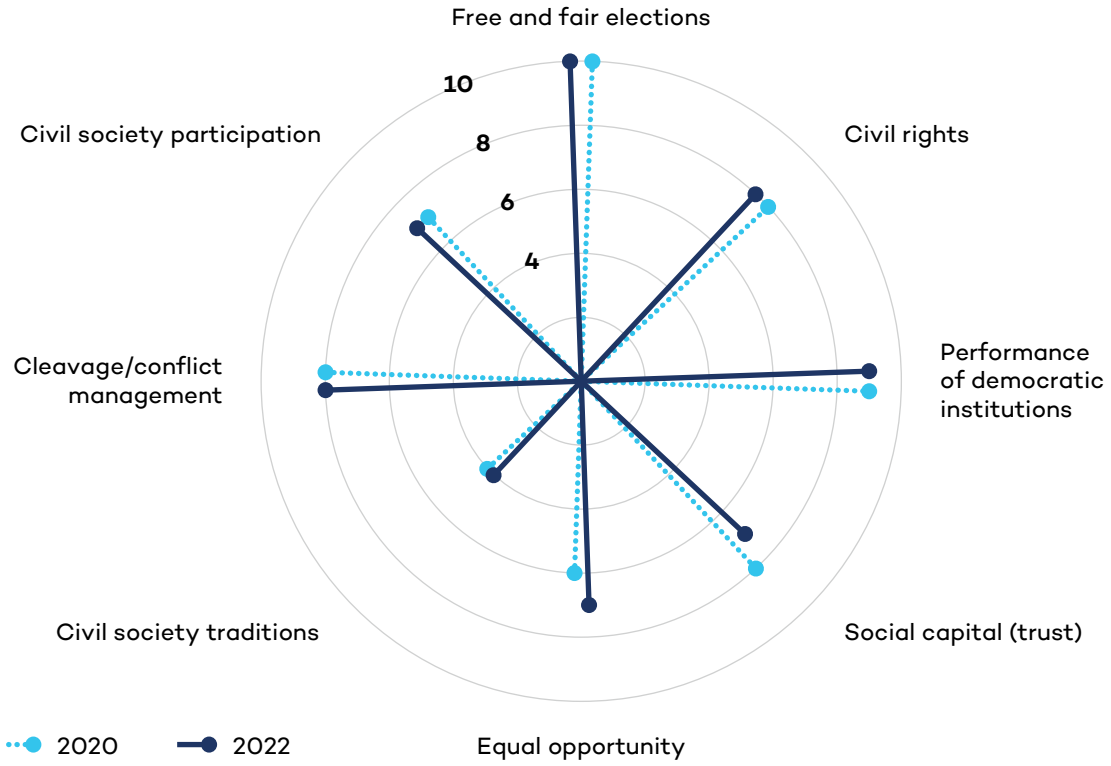
Of eight social capital indicators selected from the Bertelsmann Transformation Index (Bertelsmann Stiftung, 2022) for the period 2020–2022,[17] Trinidad and Tobago scored highly on three: free and fair elections, cleavage/conflict management, and the performance of democratic institutions (Figure 13). The high score for cleavage and conflict management indicates a social preference for peace and political stability. This social preference is reflected in the role played by the Community Mediation Services Division within the Ministry of Community Development, Culture and the Arts (Ministry of Sport and Community Development, 2020). A number of programs aiming at fostering peace and political stability are run by the community, focusing on areas such as anger management, building trust and managing conflict, leadership skills, effective communication, conflict de-escalation, emotional intelligence, and stress management.

Despite scoring highly in free and fair elections, cleavage/conflict management, and democratic institution performance, the country lags in civil society traditions—which measures the long-term presence of public or civic engagement, the number and proactivity of civic associations, and social trust. Although the nation made progress in ensuring equal

[17] Earlier data on social capital were not available for the country.

opportunity for all between 2020 and 2022, trust—a fundamental component of social capital—declined. This decline in trust, along with the low level of civil society traditions, raises important concerns regarding the robustness of social networks, which are vital for societal prosperity, within Trinidad and Tobago society.

Figure 13. Social capital indicators, 2020 and 2022



Source: Data from Bertelsmann Stiftung, 2022.

4.0 Conclusion and Policy Implications

Trinidad and Tobago's experience highlights the risks associated with over-reliance on depletable resources like oil and gas for development. The growth of the country's fossil fuel sector has led to excessive investment in the petroleum industry and, therefore, skewing of too much of its wealth—human, produced, natural, and financial—in that direction. Investment in non-oil sectors, including agriculture, fisheries, and forestry, has received too little attention as a result. It is a classic story of "too many eggs in one basket." This story and its consequences for the country's long-term well-being are not fully clear to Trinidadians and Tobagonians because the only news they see is what is happening with GDP. While the country's GDP story is not rosy in recent years, it is much rosier than that told by comprehensive wealth. The latter points to deep and structural concerns about the sustainability of long-term well-being.

The downturn in the country's fossil fuel sector, triggered by the 2008 global recession and the depletion of its oil, drove down the value of its overall comprehensive wealth portfolio to an extent rarely seen in a wealthy country. No element of the portfolio escaped the fallout. This should be a concern for every citizen of the country. Moreover, the decline of fossil fuel wealth was reinforced by the poor performance of the non-energy sector after 2008 (Khadan, 2017). While fossil fuel wealth clearly benefits the country, it is critical that Trinidad and Tobago diversify its comprehensive wealth portfolio by identifying future investment opportunities to promote sustainability of well-being in the long term.

There are many reasons why diversification of wealth is crucial for Trinidad and Tobago's long-term well-being. The first is exchange rate and commodity price uncertainty. With high reliance on fossil fuel exports (51% of total exports in 2018, for instance, were composed of oil and gas, according to the Extractive Industries Transparency Initiative, n.d.), and the uncertainty around both exchange rates and international commodity prices, international shocks can significantly impact government revenues.

The second reason to diversify is to temper the knock-on effects of fossil fuel extraction. Due to its significance, the extraction sector plays an oversized role in the country, influencing employment, investment, and government revenues across the economy. Consequently, any contraction of fossil fuel extraction has profound implications for other sectors and for investment in other forms of capital, especially human capital.

The third reason is the inevitable depletion of fossil fuel resources. Trinidad and Tobago's fossil fuel resources may run out by 2030 at current rates of depletion (Khadan, 2016). By definition, resilient well-being cannot be built on the basis of depletable assets. Therefore, diversifying toward more renewable forms of wealth—including renewable energy resources—is imperative if the country aims to ensure the well-being of future generations.

The last argument in favour of diversification is the likely contraction in global demand for fossil fuels. Even if oil and gas were not depletable, the current global shift toward green energy suggests that global demand for oil and gas will eventually decline. This will have significant implications for government revenues and the overall economy in Trinidad and Tobago, especially as a relatively high-cost producer.

This study has demonstrated—using metrics never before employed in Trinidad and Tobago—just how much the country's reliance on the combination of GDP growth and fossil fuel extraction jeopardizes its long-term well-being. International price shocks have dramatically impacted the value of its fossil fuel assets, driving them to nearly zero in recent years and dragging the value of other key assets—most notably human capital—down with them. Such dramatic losses of wealth are not sustainable. Moreover, their consequences for well-being are not evident when GDP is used as the sole lens for assessing progress. As a result, Trinidad and Tobago's people and their leaders are not as aware as they should be of the situation they face. An urgent change in the metrics used to guide decision making is called for. Trinidad and Tobago—along with other countries in the region—should begin compiling and using comprehensive wealth measures as part of its decision-making toolkit.

To this end, the following steps toward integration of comprehensive wealth measures into policy-making, as laid out in Smith et al. (2022), are recommended:

- **Informing decision-makers about comprehensive wealth.** Senior decision-makers in government departments with central and cross-cutting roles should inform themselves on the importance of moving beyond GDP and the reasons why comprehensive wealth is a key step in this direction. The arguments should make it clear that comprehensive wealth is not meant to replace GDP, but to complement it with the purpose of improving decision making. By working with both comprehensive wealth and GDP, decision-makers would be better equipped to balance short- and long-term considerations.
- **Compiling official estimates of comprehensive wealth.** Trinidad and Tobago's CSO should be mandated and funded to begin the measurement of comprehensive wealth on a regular basis. Depending on the available financial and human resources, the work could initially focus on produced capital, financial capital, and the part of natural capital related to commercial natural resources (e.g., timber, minerals, and oil and gas). Because the management of wealth touches all sectors of the economy and society, it is essential that ministries support the compilation of data and the analysis by the statistical office.
- **Using comprehensive wealth for decision making.** The last step is a commitment to integrate comprehensive wealth metrics into government decision making and processes. The metrics should be used to shape new policies and/or to revise existing ones. Since comprehensive wealth can support the achievement of key national ambitions, including the Sustainable Development Goals, the country's vision, and national development strategies, it should be monitored along with these strategic documents to inform development strategies and budget priorities.

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Appendix A. Methods and Data Sources

A1. Produced Capital

The approach to measuring produced capital follows the Organisation for Economic Co-operation and Development (2009) *Measuring Capital Handbook* and can be summarized in few steps. Initially, the nominal value of the produced capital stock in the base year is estimated by taking the ratio between nominal gross investment and the sum of the depreciation rate and the long-term real GDP growth rate. This can be expressed as follows:

$$K_0^s = \frac{I_0^s}{(\partial^s + \theta)} \qquad \textbf{A1}$$

where K_0^s is the nominal produced capital stock in sector s (agriculture, forestry, mining, manufacturing, etc.) in the base year; I_0^s the nominal gross fixed capital formation (GFCF) in sector s in the base year; ∂^s the annual average of depreciation rate of capital for sector s; and θ the long-term annual real GDP growth of the sector. Although this study covers the period 1995–2020, the base year for the capital stock estimate was set to 1970, to take advantage of the long historical series available for GFCF. This improves the accuracy of the estimation. I_0^s is obtained by taking a 5-year average of GFCF around the base year. This smoothing of GFCF ensures that potential outliers in the year 1970 would have negligible influence on I_0^s. The average is computed over the period 1966–1970 as:

$$I_0^s = \frac{\sum_{t=1966}^{1970} I_t^s}{5} \qquad \textbf{A2}$$

where I_t^s is the nominal value of GFCF in sector s and year t. Next, using the estimated nominal capital stock in the base year, annual produced capital values are calculated through the accumulation of GFCF each year net of depreciation of capital stock in the previous year. This dynamic relationship is expressed as:

$$K_t^s = K_{t-1}^s + GFCF_t^s - (\partial^s \times K_{t-1}^s) \qquad \textbf{A3}$$

where K_t^s is the nominal value of the produced capital stock in sector s and year t; K_{t-1}^s the nominal produced capital stock by sector s in year $t - 1$; $GFCF_t^s$ is the nominal GFCF for sector s in year t and ∂^s the annual average of depreciation rate of capital for sector s, defined earlier. Finally, produced capital in inflation-adjusted (real) terms is obtained by dividing the nominal values of produced capital K_t^s estimated earlier by the consumer price index (CPI) base 2017. To normalize the estimates in per capita terms, K_t^s is divided by total population. The value in constant 2017 USD was computed using the World Bank's PPP conversion rate for 2017 (TTD 4.16/USD). Produced capital was estimated at the aggregate level and for two important sectors for which sufficient data were available: oil, and agriculture, forestry, and fisheries (AFF).

Aggregate Estimate

GFCF series were compiled from both the Central Statistical Office (CSO) and the United Nations (UN Data, 2019). Long-term real GDP growth was set to 2.8% and calculated using real GDP growth series. A depreciation rate of 4.1% was calculated as the weighted average of the depreciation of different asset types (such as buildings, plant machinery and equipment, vehicles, and other transport equipment) where the weight is the asset's life. Data on depreciation rates were provided by the CSO.

Oil Sector Estimate

The gross fixed capital formation series for oil production and exploration did not cover the entire period of study and so was extrapolated using the average share of oil GFCF in oil GDP for the available period (1970–2003). Both GFCF and GDP were smoothed before averaging to reduce the effects of possible outliers. The depreciation rate was set to 10% and long-term real GDP growth— of oil production and exploration—estimated at 1.3%.

AFF Sector Estimate

The GFCF series were compiled using both the CSO and FAO capital stock databases (Food and Agriculture Organization of the United Nations, n.d.). Since the AFF sector for economies like Trinidad and Tobago is more dominated by the use of buildings, storage, and construction facilities—which have relatively low depreciation rates—the depreciation rate was set to 4.1%, similar to the rate applied in the aggregate produced capital estimate.

A2. Natural Capital

The measurement of natural capital has two components. The first is related to market natural capital and is expressed in monetary terms. The second component covers non-market natural capital and considers assets for which monetary values cannot be readily compiled. These assets are measured in physical terms (e.g., areal extent).

A2.1 Market Natural Capital

Market natural capital is valued based on the resource rents accruing to the asset. Resource rent is calculated as the difference between the revenues earned in a resource extraction activity in a given year and the costs of that activity, including materials, energy, labour, and produced capital inputs (opportunity cost plus depreciation). It is computed as follows:

$$RR = TR - C - (rK + \delta) \qquad \textbf{A4}$$

where RR refers to annual resource rent, TR is total revenue from resource extraction (net of subsidies), C total extraction costs (materials, energy, labour), r the rate of interest, K the value of the produced capital stock used in the extraction process, and δ depreciation of the produced capital stock. The value of the stock of natural asset i is equal to the present value of the expected future income from its use:

$$V^i = \int_{t=1}^{T} \frac{RR}{(1+r)^t} \qquad \textbf{A5}$$

where V is the in-situ value of the natural resource asset, T the expected remaining asset life, t the time, and RR the annual resource rent (calculated as above). The total value of natural capital assets (V_t) in time t is derived by adding all individual (V_t^i):

$$Vt = \sum_{t=1}^{s} V_t^i \qquad \textbf{A6}$$

The nominal value of natural capital is then inflation adjusted (using CPI, base 2017) and divided by total population to obtain the per capita real natural capital. Like other capital types, the values in TTD constant, 2017 were converted into USD using the World Bank's PPP conversion rate for 2017 (TTD 4.16/USD). Due to challenges in obtaining cost data, the assets estimated in this study are associated with two primary sectors, namely oil and gas extraction—the major contributor to the economy—and the agricultural sector, which also includes forestry and fishery (denoted AFF).

Data were compiled from national sources. GDP was used as a proxy for total revenue less extraction costs (TR-C) and was obtained from the Central Bank, the CSO and West Indiana Alma Jordan Library at the University of the West Indies, St. Augustine Campus. For the cost data, the disaggregated GDP by cost helped identify the cost components of the series. Compensation of employees was used as a proxy for labour cost. Regarding capital stock, the produced capital data estimated for the study was used. The depreciation rate was computed as the average ratio between consumption of fixed capital (taken from the cost component of GDP) and produced capital. The government average 10-year bond rate, on the other hand, was used as a proxy for interest rate. The discount rate was set to 7%.

A2.2 Non-Market Natural Capital

Non-market natural capital focuses on four variables: mangrove forest area, terrestrial forest area, temperature, and precipitation. Mangrove area was selected for its critical importance in protection of coastlines from wave erosion and storm surge in Trinidad and Tobago (Juman, 2021). Forest area was chosen for its role in providing habitat, food, renewable energy, cultural and environmental services, and sequestration of carbon. As for temperature and precipitation, they are well-known for capturing the effect of climate change. Both temperature and precipitation are measured in terms of departure from 30-year normals. The normal for a given month is derived from the monthly average precipitation and temperature over a 30-year period for the associated month (WMO, 2017). The conventional climate normal period defined by the World Meteorological Organization is 1981 to 2010 (WMO, 2017).

A2.2.1 Precipitation and Temperature

The percentage departures from normal for precipitation were computed for each month of the study period (1995–2020) to determine the changes in observed precipitation relative to the 30-year average. For January 1995, for instance:

$$\begin{matrix}\textit{January 1995 percentage (\%)}\\ \textit{departure from normal}\end{matrix} = \frac{\begin{matrix}\text{1981 } \textit{to} \text{ 2010 } \textit{normal for January}\\ -\textit{Total precipitation in January 1995}\end{matrix}}{\text{1981 } \textit{to} \text{ 2010 } \textit{normal for January}} \times 100 \qquad \textbf{A7}$$

Annual departures from normal were calculated in the similar way using the annual normals (i.e., total annual precipitation from 1981 to 2010 divided by 30) and the total precipitation for the corresponding year. Precipitation was measured for Trinidad, Tobago, and nationally by taking the weighted average of precipitation of both subnational areas, where the weight is the area relative to the country's total area.

Similar to precipitation, temperature was measured in terms of departure from normal (1981–2010). The departure from normals for each month was measured by subtracting the normal from the average temperature of that month. For January 1995, for instance:

$$\textit{Departure January } 1995 = \textit{Average temperature January } 1995 - 1981 \textit{ to } 2010 \textit{ normal for January} \quad \textbf{A8}$$

Similar to precipitation, annual departures and the weighted average national temperature departures were also estimated.

A2.2.2 Forests and Mangroves

Data on forest and mangrove areas were compiled from the World Bank and Trinidad and Tobago's Institute of Marine Affairs respectively. Monthly temperature and precipitation data, including the 30-year normal, were provided by the Meteorological Service. National temperature and precipitation were calculated as the weighted sum of Trinidad island and Tobago island estimates, where the weight is the size of each island.

A3. Human Capital

The measurement of human capital is most commonly conducted using the either the cost-based or the lifetime-income approach. The cost-based approach measures the cumulated investment in education and training less the depreciation of skills and knowledge (Kendrick, 1976; Eisner, 1985, 1988). The lifetime-income approach, a modified version of which was adopted in this study, measures the discounted value of future income individuals expect to earn throughout their lifetime (Jorgenson & Fraumeni, 1989, 1992a, 1992b). It reflects the return on investment in human capital.

A comprehensive application of the lifetime-income approach is data intensive. The following time series—disaggregated by age, gender, and level of education—are required: population, student population and enrolment, school duration, employment, labour incomes, and survival rates (UNECE, 2016). To overcome the data challenge experienced in this project, the approach used a simplified version of the lifetime-income approach in which human capital (HC_t) was computed as the simple discounted flow of future labour income flows.

$$HC_t = \sum_{n=1}^{\infty} \frac{LC_t}{(1+r)^n} \quad \textbf{A9}$$

Equation (7) can be simplified by removing the summation in instances, like human capital, where the benefits (income) can be expected to flow indefinitely. This leads to the following expression:

$$HC_t = \frac{LC_t}{r} \quad \textbf{A10}$$

where LC_t refers to labour compensation in year t. It includes both compensation of employees from the formal sector and earnings from self-employment in the formal and informal sectors. r is the discount factor, set to 7%. Data on compensation of employees was obtained from the cost components of income-based-GDP, available from the CSO. Missing values were extrapolated using historical shares of labour compensation in GDP going back to 1981, the earliest available data point. As for the labour income of the self-employed, assumptions were made on the share of labour in gross operating surplus for each sector of the economy. Similar to other monetary estimates, nominal values of human capital were deflated using the CPI (base 2017) and estimated in per capita terms by dividing the real values by total population. Per capita real human capital was computed for the overall economy and the oil sector. The values in constant 2017 TTD were converted into USD using the World Bank's PPP conversion rate for 2017 (TTD 4.16/USD).

A4. Financial Capital

Financial capital is captured by the international investment position (IIP), which is the difference between the value of foreign financial assets (FA) owned by residents and the value of financial assets owned by non-residents:

$$IIP = (FA) - Foreign\ Financial\ Liabilities\ (FL) \quad \textbf{A11}$$

FA can be decomposed as:

$$FA = Direct\ Investment_a + Portfolio\ Investment_a + Financial\ Derivatives_a + Other\ Investment_a + Reserve\ Assets_a \quad \textbf{A12}$$

And foreign FL as:

$$FL = Direct\ Investment_l + Portfolio\ Investment_l + Financial\ Derivatives_l + Other\ Investment_l \quad \textbf{A13}$$

Note that reserve assets are not included in financial liabilities since they are stock of assets owned by the country's central bank or monetary authority with no liability counterparts. The data covers the period 2001 to 2020 and was compiled from the Central Bank.

A5. Social Capital

In the context of sustainability, social capital is captured via two key indicators: civic engagement and trust and cooperative norms. As underscored by Scrivens and Smith (2013), trust and cooperative norms contribute to well-being at both individual and collective levels. They are persistent over time and can be transmitted to next generations. In this project, due to challenges in obtaining national data on trust and civic engagement, international data sources were sought. Instead, the Bertelsmann Transformation Index (Bertelsmann Stiftung, 2022) database was used. A list of eight indicators of social capital covering the available period (2020 and 2022) was selected for use.

Appendix B. Detailed Results (Monetary Values Only)

Table B1. Produced capital per capita, constant 2017 prices

	Fossil fuel extraction		Agriculture, forestry, and fisheries		Total	
Year	TTD	USD	TTD	USD	TTD	USD
1995	$33,079	$7,947	$1,523	$366	$124,937	$30,015
1996	$38,508	$9,251	$1,443	$347	$131,595	$31,615
1997	$45,744	$10,990	$1,358	$326	$139,728	$33,569
1998	$55,826	$13,412	$1,284	$309	$151,957	$36,507
1999	$64,534	$15,504	$1,207	$290	$162,748	$39,099
2000	$70,461	$16,928	$1,136	$273	$170,133	$40,873
2001	$76,511	$18,381	$1,050	$252	$174,601	$41,947
2002	$84,404	$20,277	$981	$236	$181,239	$43,541
2003	$95,360	$22,910	$923	$222	$193,052	$46,379
2004	$103,074	$24,763	$867	$208	$201,611	$48,436
2005	$109,473	$26,300	$798	$192	$202,568	$48,665
2006	$114,891	$27,602	$723	$174	$199,117	$47,836
2007	$122,558	$29,444	$658	$158	$196,591	$47,230
2008	$128,306	$30,825	$577	$139	$188,690	$45,331
2009	$134,797	$32,384	$535	$128	$195,375	$46,937
2010	$133,131	$31,984	$481	$116	$195,534	$46,976
2011	$134,168	$32,233	$457	$110	$205,739	$49,427
2012	$132,025	$31,718	$420	$101	$204,282	$49,077
2013	$134,066	$32,208	$403	$97	$209,575	$50,349
2014	$132,993	$31,951	$386	$93	$213,228	$51,227
2015	$129,818	$31,188	$377	$91	$218,179	$52,416
2016	$125,442	$30,137	$374	$90	$224,832	$54,014
2017	$121,036	$29,078	$377	$91	$231,421	$55,597
2018	$118,318	$28,425	$381	$91	$234,741	$56,395
2019	$116,084	$27,888	$381	$92	$232,979	$55,972
2020	$113,528	$27,274	$382	$92	$229,247	$55,075

Source: Authors' calculations based on data from Central Bank of Trinidad and Tobago, CSO, National Archive and FAOSTAT.

Table B2. Market natural capital per capita, constant 2017 prices

	Fossil fuel extraction		Agriculture, forestry, and fisheries		Total	
Year	TTD	USD	TTD	USD	TTD	USD
1995	$93,097	$22,366	$2,814	$676	$95,910	$23,042
1996	$98,607	$23,690	$3,021	$726	$101,629	$24,416
1997	$93,299	$22,414	$2,923	$702	$96,222	$23,117
1998	$64,888	$15,589	$2,983	$717	$67,871	$16,305
1999	$51,580	$12,392	$2,883	$693	$54,463	$13,084
2000	$71,027	$17,064	$2,469	$593	$73,496	$17,657
2001	$96,932	$23,287	$2,416	$581	$99,349	$23,868
2002	$98,703	$23,713	$2,470	$593	$101,173	$24,306
2003	$113,571	$27,285	$2,872	$690	$116,443	$27,975
2004	$145,257	$34,897	$2,741	$658	$147,997	$35,555
2005	$191,077	$45,905	$2,681	$644	$193,758	$46,549
2006	$209,779	$50,398	$2,571	$618	$212,350	$51,016
2007	$222,492	$53,452	$2,322	$558	$224,815	$54,010
2008	$262,214	$62,995	$1,988	$478	$264,203	$63,473
2009	$210,078	$50,470	$1,788	$429	$211,866	$50,899
2010	$167,140	$40,154	$1,668	$401	$168,808	$40,555
2011	$113,069	$27,164	$1,641	$394	$114,710	$27,558
2012	$115,136	$27,661	$2,104	$505	$117,240	$28,166
2013	$112,219	$26,960	$2,782	$668	$115,001	$27,628
2014	$92,132	$22,134	$3,351	$805	$95,483	$22,939
2015	$60,749	$14,595	$3,810	$915	$64,559	$15,510
2016	$20,041	$4,815	$4,076	$979	$24,117	$5,794
2017	-$6,586	-$1,582	$4,547	$1,092	$(2,039)	$(490)
2018	-$4,628	-$1,112	$4,499	$1,081	$(130)	$(31)
2019	$5,081	$1,221	$4,097	$984	$9,178	$2,205
2020	-$2,096	-$503	$3,839	$922	$1,743	$419

Source: Authors' calculations based on data from Central Bank of Trinidad and Tobago, CSO, National Archive, and Ministry of Energy and Energy Industries.

Table B3. Human capital per capita, constant 2017

	Fossil fuel extraction		Total	
Year	TTD	USD	TTD	USD
1995	$28,376	$6,817	$580,566	$139,477
1996	$27,831	$6,686	$607,525	$145,954
1997	$28,649	$6,883	$621,463	$149,302
1998	$33,125	$7,958	$640,262	$153,819
1999	$36,259	$8,711	$667,529	$160,369
2000	$39,941	$9,596	$691,740	$166,186
2001	$41,790	$10,040	$708,855	$170,297
2002	$42,777	$10,277	$709,708	$170,502
2003	$46,015	$11,055	$731,885	$175,830
2004	$49,842	$11,974	$753,574	$181,041
2005	$54,296	$13,044	$778,083	$186,929
2006	$53,906	$12,951	$808,283	$194,184
2007	$49,523	$11,898	$861,864	$207,057
2008	$42,056	$10,104	$906,496	$217,779
2009	$37,255	$8,950	$888,284	$213,404
2010	$33,779	$8,115	$841,186	$202,089
2011	$31,790	$7,637	$829,052	$199,174
2012	$28,583	$6,867	$849,665	$204,126
2013	$26,502	$6,367	$875,499	$210,333
2014	$24,735	$5,942	$866,672	$208,212
2015	$23,010	$5,528	$820,791	$197,189
2016	$20,825	$5,003	$754,121	$181,172
2017	$19,148	$4,600	$698,939	$167,915
2018	$18,400	$4,420	$681,852	$163,810
2019	$18,432	$4,428	$678,688	$163,050
2020	$17,663	$4,244	$646,509	$155,319

Source: Authors' calculation based on data from CSO and Central Bank of Trinidad and Tobago.

Table B4. Financial capital per capita, constant 2017

	International investment position		Net foreign assets		Net foreign liabilities	
Year	TTD	USD	TTD	USD	TTD	USD
1995	n/a	n/a	n/a	n/a	n/a	n/a
1996	n/a	n/a	n/a	n/a	n/a	n/a
1997	n/a	n/a	n/a	n/a	n/a	n/a
1998	n/a	n/a	n/a	n/a	n/a	n/a
1999	n/a	n/a	n/a	n/a	n/a	n/a
2000	n/a	n/a	n/a	n/a	n/a	n/a
2001	-$70,531	-$16,945	$39,309	$9,444	$109,840	$26,388
2002	-$14,001	-$3,364	$34,918	$8,389	$48,919	$11,752
2003	-$15,979	-$3,839	$42,244	$10,149	$58,223	$13,988
2004	-$2,155	-$518	$48,397	$11,627	$50,552	$12,145
2005	-$2,044	-$491	$57,180	$13,737	$59,224	$14,228
2006	-$707	-$170	$71,112	$17,084	$71,819	$17,254
2007	-$654	-$157	$65,792	$15,806	$66,446	$15,963
2008	$26,817	$6,442	$144,761	$34,778	$117,944	$28,335
2009	$24,862	$5,973	$136,086	$32,694	$111,225	$26,721
2010	$7,395	$1,777	$129,674	$31,153	$122,279	$29,377
2011	-$665	-$160	$142,656	$34,272	$143,322	$34,432
2012	$20,707	$4,975	$133,781	$32,140	$113,074	$27,165
2013	$26,495	$6,365	$132,831	$31,912	$106,337	$25,547
2014	$34,575	$8,306	$136,433	$32,777	$101,859	$24,471
2015	$29,852	$7,172	$123,498	$29,669	$93,646	$22,498
2016	$24,946	$5,993	$122,947	$29,537	$98,001	$23,544
2017	$23,282	$5,593	$120,794	$29,020	$97,512	$23,427
2018	$18,219	$4,377	$112,953	$27,136	$94,734	$22,759
2019	$20,548	$4,936	$118,489	$28,466	$97,941	$23,530
2020	$10,821	$2,600	$114,474	$27,501	$103,652	$24,902

Source: Authors' calculation based on data from Central Bank of Trinidad Tobago.

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