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Economic impacts of COVID-19 on the tourism sector in Tanzania

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Abstract

The worldwide COVID-19 pandemic has affected the tourism sector by closing borders, reducing both the transportation of tourists and tourist demand. Developing countries, such as Tanzania, where the tourism sector contributes a high share to gross domestic product, are facing considerable economic consequences. Tourism interlinks domestic sectors such as transport, accommodation, beverages and food, and retail trade and thus plays an important role in household income. Our study assessed the macroeconomic impacts of COVID-19 on the tourism sector and the Tanzanian economy as a case study of an impacted developing economy. We used a computable general equilibrium model framework to simulate the economic impacts resulting from the COVID-19 pandemic and quantitatively analysed the economic impacts.

Keywords: COVID-19, Tourism, Tanzania, Developing country, Computable general equilibrium model

JEL code: I18, Z32, E02, C68

Economic impacts of COVID-19 on the tourism sector in Tanzania

1. Introduction

The COVID-19 pandemic has severely affected the tourism sector worldwide by closing borders, reducing the transportation of tourists, and decreasing tourist demand. Tourism is the hardest-hit sector (OECD 2020). Indeed, in 2020, it was predicted that international tourism would fall by 80 per cent (OECD, 2020). Countries whose tourism sectors contribute a high share to gross domestic product (GDP) are facing considerable economic impact as the tourism sector is an important driver of economic development (Sinclair, 1998; Faber & Gaubert, 2019), particularly in transitioning and developing countries (Khan et al., 2020; Ming Che Chu, 2013; Liu & Wall, 2006; Pelizzo & Kinyondo, 2015). For example, in Africa, the tourism sector contributes around 9 per cent to real GDP and supports approximately 7 per cent of all jobs. Thus, during the last few decades, the tourism sector has received attention from both tourism researchers and development economists alike (De Kadt, 1979; Mings, 1981; Ghimire, 2001; Rogerson, 2008; Brown & Hall, 2008).

In developing countries, where the tourism sector is of high importance to the economy, the COVID-19 pandemic has had a significant negative impact. First, the pandemic has directly affected the whole economy and society through health consequences and measures against it (e.g. increased hospitalisation and many lethal cases, economic lockdown, closure of schools). Second, the pandemic has impacted the tourism sector in particular, which is very important for economic growth and employment. Third, since tourism is linked to many other economic sectors (Sinclair, 1998; Faber & Gaubert, 2019), the negative impacts of COVID-19 on the tourism sector are channelled to linked sectors. These impacts are therefore of high interest to researchers and politicians. The differentiated information on these impacts is relevant for the design of measures and policy decisions in counteracting the negative economic impacts of COVID-19. Particularly in developing countries, which are vulnerable to any economic shock, such information could help support economic growth and reduce the increase in poverty.

Tanzania is a developing country where tourism is a key sector for economic growth (Curry, 1990; Wade et al., 2001; Antonakakis et al., 2016). In 2019, the tourism sector was the second-largest component of GDP, with a contribution of 17 per cent (World Bank, 2021a). In terms of employment, the sector is the third-largest source of employment, with 850,000 workers (World Bank, 2021a). Moreover, the sector has strong linkages with other domestic sectors such as transport, accommodation, beverage and food, and the retail trade (Mayer et al., 2016). Tourism creates direct and indirect jobs for low and unskilled workers, making it an important driver of economic growth and the fight against poverty (Pelizzo & Kinyondo, 2015). Tourism stimulates domestic and foreign investments in new infrastructure and management of hotels, aviation, training, and travel services, tour operators' businesses, marketing, and promotion of tourism activities (Mwakalobo et al., 2016). Furthermore, foreign currency earnings from tourism allow for the importation of capital goods that support domestic production (Brida et al., 2020).

Since March 2020, the Tanzanian government has adopted key measures to curb the COVID-19 outbreak (BOT, 2020). These measures have had an impact on all sectors, including the Tanzanian tourism sector, as one of the most important industries for economic growth and employment. The real GDP growth rate declined from 6.9% in 2019 to 4.8% in 2020 owing to regional trade disruptions and contraction in tourism and related sectors as a result of the COVID-19 pandemic (NBS, 2021). Our study assesses the macroeconomic impact of COVID-19 on the tourism sector and the Tanzanian economy. We use a dynamic computable general equilibrium model to assess the macroeconomic impacts of the COVID-19 pandemic on the tourism sector and the Tanzanian economy. Our analysis provides results

that will be of interest to researchers and policymakers (i) as information on the impacts of global shocks on the tourism sector in a developing country such as Tanzania; (ii) as information to be used as support for the design of post-COVID-19 response policies; and (iii) to extend the academic literature on modelling the impact of COVID-19 in Tanzania.

2. Literature review

2.1. Tourism and computable general equilibrium model studies

The tourism sector is linked multiple times in the economy to many sectors and economic agents (Dwyer et al., 2004; Dwyer, 2015). It is, therefore, important to capture the links between the tourism sector and the rest of the economy, especially in countries where tourism is important for economic development, as in Tanzania (Curry, 1990; Wade et al., 2001). Computable general equilibrium (CGE) models are tools used to assess the impact of external shocks on specific economic sectors, such as tourism, as they consider retroactive effects. The CGE model is applied to analyse the impacts of fiscal policy reforms on tourism in both developed and developing countries (e.g. Ihalanayake, 2012; Ponjana & Thirawat, 2016; Meng, 2012, Mabugu, 2002), to evaluate the impacts of investment projects (e.g. Banerjee et al., 2016), and to assess changes in international commodity markets (e.g. Becken & Lennox, 2012; Yeoman et al., 2007), or in tourism demand (e.g. Blake et al., 2006). Dwyer (2015) and Van Truong and Shimizu (2017) present an overview of CGE applications on tourism-related research questions. They conclude that despite its relative suitability, "CGE modelling remains relatively under-used in tourism policy analysis" (Dwyer 2015: 124) and that it is even rare in the analysis of specific tourism-related topics like transportation (Van Truong & Shimizu, 2017: 3106).

In developing countries, the tourism sector has been identified as a potential channel for increasing economic growth and alleviating poverty (Alam & Paramati, 2016; Honey & Gilpin, 2009; World Tourism Organization and International Labour Organization, 2013; Khan et al., 2020). Thus, tourism studies in developing countries often address research questions on economic growth, employment, and income. Several phenomena described in theoretical and empirical studies have also been described in studies using input-output tables or CGE models as analytical frameworks for African case studies.

(i) Inter-sectoral linkages: Tourism has significant backward linkages to sectors that supply tourists' consumption demand, such as accommodation, restaurants, beverages and food, retail trade, and transport (Mayer and Vogt, 2016; Eric et al., 2020; Njoya & Nikitas 2020; Suau-Sanchez et al., 2020). Transport and accommodation tourism is indirectly linked to the construction sector, which builds infrastructure for both (Kweka, 2004; Adam et al., 2018). In an input-output analysis for Tanzania, Kweka et al. (2003) find that tourism can contribute to increasing tax revenue and exchange earnings resulting from the linked sectors. In addition, linkages to natural resource sectors can be highly relevant to the tourism value chain (Damiana & Scandizzo, 2017). In agriculture, the tourism sector has relatively weak backward linkages as a traditional sector for exports and subsistence production. Thus, tourism expansion does not necessarily result in income generation for rural farming households. Expansion of tourism can even create a contraction in sectors with weak linkages, caused by sectoral competition for production factors or by the Dutch disease effect (Kweka et al., 2003, Njoya & Seetaram, 2018).

(ii) Competition for production factors and Dutch Disease: An expanding tourism sector can compete with other sectors for production factors (e.g. land or labour), resulting in non-tourism sectors being deprived of production factors (e.g. land for agriculture). The sectoral competition for production factors depends on the regional economic situation and

the type of tourism. Less labour-intensive tourism often uses intensive natural resources and land (e.g. large-scale resorts, national parks, and safaris) (Karim & Njoya, 2013; Njoya & Seetaram, 2018; Damania & Scandizzo, 2017). Expanding tourism (as inbound tourism) increases the export of tourism as a service to foreign tourists and thus can change the current account balance and appreciation of the local currency. If the changes in currency appreciation increase the value of the local currency, then the prices of locally produced non-tourism goods and services increase. Becoming more expensive, the traditional exporting sectors (such as agriculture) can lose their competitiveness because relatively cheaper imported products are in high demand. By contracting the production of domestic non-tourism commodities, a growing tourism sector can have negative impacts on the growth of the non-tourism exporting sector(s). Njoya and Seetaram (2018), Karim and Njoya (2013), Damania and Scandizzo (2017), Jensen et al. (2010), and Kweka (2004) describe these phenomena in Kenya and Tanzania in their CGE studies.

(iii) Economic policies: Identified as a pro-growth and pro-poor sector, the support of tourism by economic policies (e.g. taxation, trade reforms or investments) is an interesting research topic in developing countries. However, the impact of economic policies on growth, employment, and poverty can vary between countries, regions, and socioeconomic groups. For example, in their study Gooroochurn and Sinclair (2005) point out that in Mauritius, taxation of tourism sectors or tourists can be more efficient and equitable than levying other sectors and can create a high income for government and households. However, enterprises can suffer income losses if tourist consumption decreases, caused by increased prices from tourists' consumption (Kweka, 2004). The liberalisation of barriers against domestic and multinational service providers in the tourism sector can reduce the production cost of tourism. Thus, trade reform policies could support the expansion of tourism (Jensen et al., 2010).

Investment in transport infrastructure can be a measure to reduce production costs and increase efficiency in the tourism sector, and it has been found that the impacts on poverty and income can be unevenly distributed in the economy. Kweka (2004) describes how investments in transport infrastructure have more positive effects for rural than for urban households. However, Njoya &Nikitas (2020) find in a CGE study that air transport expansion in South Africa creates employment effects with more benefits for wealthy households and highly skilled workers than for poor households and unskilled workers. Thus, investments that should target the alleviation of poverty require caution and good knowledge of the impacts (Adam et al., 2018). To avoid unwanted effects such as widening income inequality, accompanying measures might be required. Such measures could improve education and training for low-skilled workers if highly skilled workers benefit from the positive outcomes of the investment (Njoya &Nikitas, 2020).

(iv) Economic growth: Tourism stimulates domestic production, employment and creates tax income (Sharma, 2006; Blake, 2008; Wamboyea et al., 2020). Indeed, several studies have reported the quantifiable positive effect of tourism on economic development in different African countries: Kenya (e.g. Honey & Gilpin 2009), Mauritius (e.g. Durbarry 2002), Botswana, Namibia, South Africa, Tanzania, Uganda, Zambia, and Zimbabwe (e.g., Manrari et al. 2019). Tourism expansion can be initiated by economic policies, but expansion and contraction can also result from the development of economic settings, either from a trend over time or from event-based economic shocks (e.g., catastrophes, terrorist activity, outbreaks of pandemics). In CGE studies, Njoya and Seetaram (2018), Karim and Njoya (2013), and Kweka (2004) find that growing inbound tourism created a net benefit to the national economy in Kenya and Tanzania. Karim and Njoya (2013) find in Kenya that tourism expansion is pro-growth, particularly for hotels, restaurants, construction, and the agricultural sector. However, there was decreased growth in the manufacturing sector. This

finding differs from those of Njoya and Seetaram (2018) and Kweka (2004), who explain how the expansion of tourism in Kenya and Tanzania caused Dutch disease and a contraction of the agricultural sector as a weakly linked sector for traditional exports.

(iv) Tourism and labour markets: Tourism has many benefits for middle- and upper-income households or tour operators–often foreign owners–while households not linked to tourism attractions (e.g. in rural areas) benefit less (Eric et al., 2020; Kweka, 2004). Foreign inbound tourism contributes relatively more to less-skilled wage earners than to high-income workers, making it regarded as pro-poor (Incera & Fernandez 2015). Thus, in rural regions with tourism activities, tourism can have a positive effect on economic empowerment. Informal jobs allow even women in rural regions to simultaneously engage in childcare and earn money; hence tourism can assist in elevating the social status of women, helping them to afford education, and contribute to household income (Buzinde et al., 2014). Njoya and Seetaram (2018) show that for Kenya, industries with linkages to the tourism sector increase labour demand in contrast to non-tourism sectors, which has a reverse effect. The demand for unskilled labour increases faster than the demand for skilled and semi-skilled labour (Njoya & Seetaram, 2018).

(v) Household income: The distribution of tourism income varies across rural and urban households. Urban households gain higher income from tourism-related industries than rural households (Eric et al., 2020; Njoya & Seetaram, 2017; Kweka, 2004). Poor (and rural) households receive less income in tourism-related industries and more from other activities such as the primary sector (e.g. agriculture, fishing, and forestry) (Blake, 2008). Thus, some authors consider the redistribution of the tourism sector's benefits to be a measure to counteract poverty and inequality in developing countries (Hall, 2007; Gascon, 2014; Scheyvens, 2009; Alam et al., 2016). Karim and Njoya (2013) find in a CGE study on Kenya that tourism expansion benefits mostly rural households. Njoya and Seetaram (2018) and Kweka (2004) describe rural and farming households as benefitting less than urban households. Njoya and Seetaram (2018) and Kweka (2004) find that tourism expansion causes unevenly distributed increases in income among middle- and upper-income households in rural and urban regions. Poverty falls faster in urban than rural areas due to decreased labour demand and earnings in rural households from the agricultural sector.

(vi) Negative impacts on tourism. While most of the reviewed studies have analysed the impacts of policies or scenarios with a positive impact on tourism, until the COVID-19 crisis, only a few studies have analysed scenarios with negative impacts on tourism Damania and Scandizzo (2017) simulated the impacts of reducing the wildlife population, which is the natural capital for safari tourism. Damania and Scandizzo (2017) find a negative impact on sectoral growth and an impact from the exchange rate, which spills over to the whole economy. These impacts are especially large among (poor) rural households, resulting from the reduction of foreign exchange flows. Even measures to increase agricultural productivity cannot compensate for losses in tourism and bushmeat hunting.

2.2. Computable General Equilibrium studies on tourism and COVID-19

Although the economy-wide impacts of COVID-19 have already been analysed using CGE models, to date, only a few studies have quantitatively evaluated the impacts of COVID-19 on the tourism sector (Zenker & Kock, 2020), and few used the CGE or dynamic stochastic general equilibrium (DSGE) framework. Gopalakrishnan et al. (2020) used a CGE model to analyse the short- and medium-term impacts of COVID-19 on the tourism sector in countries with major tourist destinations and those highly dependent on tourism. The authors identified strong linkages and spillover effects between tourism and other sectors. The decline in tourism demand impacts employment and income in many economic sectors. Pham et al.

(2021) find comparable significant short-run impacts on job losses in Australia's tourism sector and industries linked to it, ranging from 152,000 jobs (for the tourism sector only) to more than 400,000 (for tourism and tourism linked industries).

Leroy de Morel et al. (2020) find for New Zealand that the economic impacts on the tourism sector spill over to the sectors directly linked to tourism industries (e.g. accommodation, food, and transportation services). Travel bans and mobility reductions severely decreased demand for these sectors. At the same time, the imposition of restrictive and isolation measures decreased the output of sectors not directly linked to tourism because of reduced availability of labour and capital (e.g. manufacturing, construction, and other services). Ayadin and Ari (2020) show that for Turkey, COVID-19 reduced the output and exports of the tourism and transport sectors, and falling world crude oil prices compensated partially for this fall by reducing energy costs. In addition, in industries not directly linked to the tourism sector, the decreased oil price reduced production costs and increased output. Yang et al. (2020) evaluated the impact of COVID-19 on the tourism sector with health status and health disaster indicators and quantified the impacts of different levels of infection risks on the tourism sector's output and labour productivity. For the longer and greater infection risk of COVID-19, the authors expect significant losses for the tourism sector and the whole economy.

Simulating the impact of COVID-19 on the whole economy, including all sectors, agents and labour market impacts, results in greater effects on GDP and employment than a partial analysis focused only on the tourism sector. A relatively high number of studies have applied CGE models to analyse tourism-related questions for Tanzania (e.g. Kweka et al., 2003; Jensen et al., 2010; Kweka, 2004; Damania & Scandizzo, 2017; Adam et al., 2018). To date, however, no CGE study has quantified the impacts of COVID-19 on the tourism sector in Tanzania. Our study contributes to the academic literature by providing a quantitative analysis of the long-term economic impacts of COVID-19 on the tourism sector in Tanzania. It also offers the possibility of transferring the findings to other developing countries that rely on the tourism sector and shows the impacts if no action is taken by the government.

3. Tourism in Tanzania and COVID-19

The tourism sector in Tanzania has experienced rapid development in steering the Tanzanian economy (Curry, 1990; Wade et al., 2001). After independence in 1961, tourism development faced many challenges, namely, poor transportation, accommodation, and information facilities, weak internal tourism education, and poorly funded tourism institutional frameworks (Wade et al., 2001). During the mid-1970s, Tanzania tourism shifted from regional to international tourism involving an expansion of investment, mainly through governmental programmes (e.g. new beaches and holiday projects). During the period 1964–1976, the Tanzanian government contributed 88 per cent of the total investment in the tourism sector. However, government investments were met by accumulating losses and a decrease in revenue caused by declining terms of trade (Curry, 1990).

Recently, the Tanzania tourism sector has grown significantly and has contributed considerably to economic growth in Tanzania (Kyara et al., 2021). Between 2016 and 2019, international tourism arrivals increased by 18.9 per cent, while foreign exchange receipts from international tourism grew by about 25 per cent during the same period. Thus, Tanzania is ranked tenth among 50 African countries in tourism growth.[1] (WEF, 2019). Until April 2020, tourism earnings accounted for more than 24 per cent of the total share of exports, making

[1] Tanzania's tourism industry accounts for USD 2.6 billion.

tourism the second largest foreign exchange earner after agriculture (NBS, 2019a). The major source markets for Tanzania's international tourism are the United States of America (13.2 per cent) and the United Kingdom (9.5 per cent).

Tanzania is endowed with a wide variety of landscapes, culture, and wildlife attractions and ranks eighth out of 136 countries globally in natural resource endowments (WEF, 2017). Tanzania's tourist destinations comprise several cultural sites and many natural sites, including six World Heritage sites. Worldwide, Tanzania is the only country that has set aside more than 25 per cent of the total reserve land for wildlife and other resources.[2] Thus, natural amenities and wildlife resources represent a large growth potential for nature-based tourism (Kweka et al., 2003; Sekar et al., 2014).

In Tanzania, most tour operators are owned by foreign entrepreneurs.[3] There is evidence that up to 60 per cent of the total profits from the tourism industry are repatriated abroad. Thus, foreign ownership prevents Tanzania from engaging a full array of economic benefits to the booming tourism industry (Ankoman & Crompton, 1990; Kinyondo & Pelizzo, 2015). However, Tanzanian tourism contributes significantly through its direct and indirect links to the domestic production of other sectors and economic development. The fact that around 80 per cent of Tanzanian tourism firms are small enterprises makes them vulnerable to financial stress. Since 2000 different global disruptive events ('black swan' events) have negatively impacted worldwide international tourism (e.g., the September 11, 2001 attacks, the 2003 SARS epidemic and the 2008–2009 global economic crisis). However, compared to historical black swan events, the COVID-19 pandemic has caused the most significant decline in global tourism (Mwamwaja and Mlozi 2020).

In March 2020, the Tanzanian government adopted key measures to curb the COVID-19 outbreak, such as travel restrictions on international travel or a mandatory 14-day quarantine for international travellers and social distancing. All of these measures affected the tourism sector. These measures were reduced when the government stopped reporting on COVID-19 test results and cases in May 2020. However, Tanzania continued to suffer from a drop in tourist arrivals. Indeed, in 2020, the number of visitors dropped by 60%, while the revenues of public sector tourism institutions decreased by 72% (from TZS 489.4 billion in 2019 to TZS 136.2 billion in 2020) (World Bank, 2021a). Unlike many other countries, Tanzania did not implement specific lockdown measures. However, the reduction in tourism travel activities impacted interlinked sectors, particularly air transport, the hotel business, and retail trade. The impact of COVID-19 on tourism in Tanzania is accompanied by various other COVID-19 related impacts, which are not linked to tourism, namely a decrease in oil prices in 2020. Others include a decline in private investment and remittances, a disruption of international trade with China, India, and some European countries (e.g. for agricultural commodities), and a temporary decline in domestic consumption.

4. Methodology and data

A dynamic CGE model was used to evaluate the short- and long-term impacts of COVID-19 on the Tanzanian economy. Computable general equilibrium models represent the entire economy, linking different sectors such as tourism to other sectors and institutions such as households. This type of macroeconomic model has been utilised to assess the impacts of pandemics (Beutels et al., 2009; Keogh-Brown et al., 2010; Fofana et al., 2015), and to

[2] Cultural sites: Dar es Salaam and the historic island of Zanzibar, Ruins of Kilwa Kisiwani and Ruins of Songo Mnara. Natural sites: Serengeti National Park, Selous Game Reserve, Kilimanjaro National Park, and Stone Town of Zanzibar, Ngorongoro Conservation Area. The conservation area includes 16 national parks, 28 game reserves, 44 controlled conservation areas, and two marine parks.

[3] There are 543 tour operator companies located in Arusha, Dar es Salaam, and Zanzibar. Arusha has the largest (401) number of tour operator enterprises, followed by Dar es Salaam (95) and Zanzibar (47).

evaluate the impacts of COVID-19 on the world economy (Maliszewska et al., 2020; Laborde et al., 2020), on a single country (Kinda et al., 2020; Chitiga et al., 2021; Erero & Makananisa, 2020), and on households' economic behaviour with gender implications (Escalante & Maisonnave, 2021; Chitiga et al., 2020, Maisonnave & Cabral, 2021).

Figure 1 presents the flow of the values in a CGE model. In the economy, tourism is linked to other domestic sectors and produces export commodity tourism services for the commodity market. The domestic commodity market provides a supply for the export market, where tourism services are sold as inbound tourism to foreign tourists. The demand for tourism services by foreign tourists determines the price of the service, thus driving the domestic production in the tourism sector. Reduced demand reduces the production of the tourism sector with a corresponding interaction with other sectors via intermediate demand. Reduced production also means a reduced payment for production factor labour to households (i.e. decreased household income). The decrease in exported tourism services and spillover effects on other sectors, income, and consumption results in a decrease in taxes paid as income to the government. Decreased governmental income forces the government to reduce investments in production, which is required to retain economic growth in the long term. Consequently, reduced investment negatively impacts economic growth.

We used the dynamic PEP 1-t model developed by Decaluwé et al. (2013) and modified it to reflect the Tanzanian economy. The model database is a social accounting matrix (SAM) which represents a snapshot of the Tanzanian economy for 2015. Indeed, this matrix is a consistent framework that retrieves all the flows recorded in the economy for a given year and provides the structure of the economy (Round, 2003). The SAM used in this study was developed by Randriamamonjy and Thurlow (2017). In line with the matrix, our model has 55 activities and 56 commodities. Of these, 25 are agricultural, 19 belong to the industrial sector, and 11 are in tourism-related sectors such as accommodation and restaurants, retail, and transportation.

We assumed that the production process is nested. At the top level, production is a Leontief-type function between intermediate consumption and value addition. In other words, there is no possibility of substituting value addition with intermediate consumption. At the next level, value addition is a constant elasticity of substitution function between aggregate labour and capital. At the last level, it was assumed that aggregate labour is a constant elasticity of substitution function between the different types of labour, while aggregate capital is a constant elasticity of substitution function between the different types of capital (e.g. land, livestock, machines). For instance, mining capital is used only by mining industries, while crop capital is used only in crop-based agricultural sectors.

Among the different types of labour, workers are disaggregated according to their level of education (no school education, primary education from grades 0 to 4, medium education from grades 5 to 11, and grade 12 or above). If we look closely at the hotel and restaurant sector in Tanzania, we find that 63.5 per cent of its production relies on intermediate consumption, and among the workers hired, more than 90 per cent have primary to secondary education levels (up to grade 11). The information on the factor demand is important for interpreting the results and explaining the links between the tourism sector and the rest of the economy, such as the link to the labour market and other sectors.

Along with the SAM, the model distinguishes three different types of institutions: households, the government, and the rest of the world. Households are disaggregated per quintile of income and whether they are in urban or rural areas. Among households living in rural areas, there is a distinction between farming and non-farming households. All households receive income from labour and capital but in different proportions. For instance, farming households belonging to the lowest quintile of income mainly receive income from unskilled and low-skilled labour, while urban households belonging to the richest quintile of

income mainly receive income from mining capital and non-agricultural capital and, to a lesser extent, skilled labour and remittances. Households spend their income on consumption, pay transfers to other institutions and direct taxes, and save the remainder.

The government's income is composed of direct taxes paid by households and firms, indirect taxes, transfers from the rest of the world, and a share of capital income. Indirect taxes account for 46 per cent of the government's income, while direct taxes account for 25 per cent, capital income (mainly non-agricultural capital) accounts for 10 per cent, and transfers from the other institutions for 19 per cent. Government savings are equal to government income less its consumption and transfers paid to other institutions (e.g. social grants, pensions, etc.). Tanzania is linked to the rest of the world via its exports and imports of commodities and through receipts and payment of transfers. Almost 40 per cent of total Tanzanian exports are derived from the service sector, such as the tourism and transport sectors. Agricultural exports account for almost 30 per cent of total exports (e.g. tobacco, coffee, tea, cotton, cashews, and sisal). Given the origin of the commodities, we modelled the links between the rest of the world and Tanzania according to the traditional approach based on the assumption of imperfect substitutability. If Tanzanian producers want to increase their market share in the international market, they need to be more competitive, which is technically translated to set up a finite elasticity for export demand.

Compared to the standard 'PEP 1-t model', we changed the assumption of full employment following the modelling of Blanchflower and Oswald (1995). We assumed a negative slope between wage rates and unemployment rates. In other words, an increase in the unemployment rate leads to a decrease in wage rates. We assumed that labour is mobile across sectors while capital is sector-specific. According to the dynamic assumptions, labour supply increases with an increase in the population rate, while the stock of capital for each sector increases as per the investments made in the sector during the year. The equation that determines the allocation of new investments follows Jung and Thorbecke (2003): in terms of other closure rules, we took the nominal exchange rate as the numeraire of our model. Following the supposition of small countries, world prices are exogenous; thus we have also presumed that the rest of the world's savings are exogenous, as well as government spending.

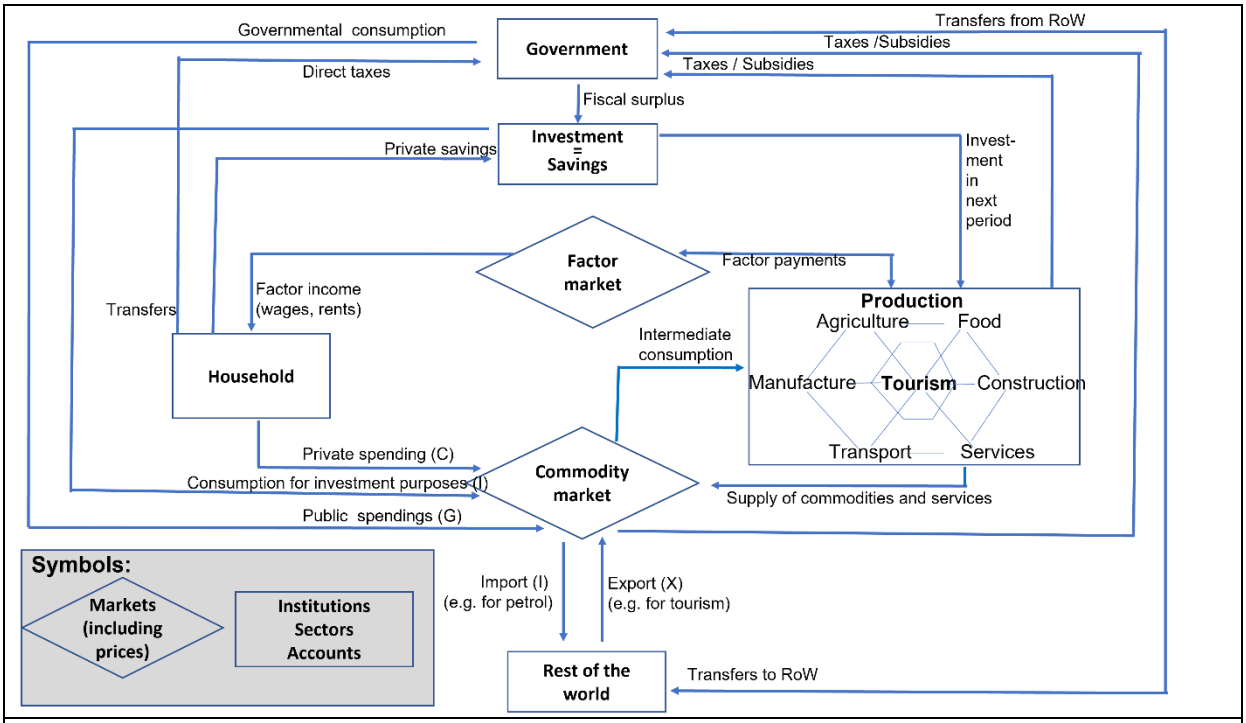

Figure 1. Schematic presentation of the flows in a CGE model. Source: authors' presentation

5. Scenario design

The COVID-19 pandemic is affecting the Tanzanian economy in many ways through international channels of transmission that are used to inform the design of the scenarios, which are presented in Table 1. In contrast to other countries, Tanzania did not apply a strict lockdown in 2020. Therefore, COVID-19 shocks are modelled exclusively through international channels. Among them, we identify three channels: remittances, world prices of commodities, and exports. Tanzanian households receive transfers from friends and relatives living and working abroad. Given the economic recession worldwide, this source of income has dwindled. From the BOT (2020), we can see that it reduced by 29.5 per cent compared to the previous year in 2020. For 2021, we assume that the drop will be 10 per cent and 5 per cent in 2022 for the severe scenario.

The COVID-19 outbreak has had an impact on world prices on different commodities in 2020, and we expect some impacts in the following years. There was indeed a drop in oil prices due to the drop in international demand, while for gold, wheat, and sugar, we observed a positive impact on world prices. This will impact the Tanzanian economy since Tanzania is a net oil importer and exporter of many minerals. The exports of coal, gold, and manganese account for 30 per cent of total exports. Finally, given the economic situation in trading partner countries, the country faces a decrease in demand for exports. Indeed, Tanzania's main trade partners (India, China, and the United Arab Emirates) face a decrease in their economy, reducing their demand for imports from Tanzania. For instance, India, which accounts for almost 30 per cent of Tanzanian's exports, is expected to face a decrease of 10.3 per cent in 2020 (IMF, 2020), while the second trade partner, the United Arab Emirates, is expected to fall by 6.6 per cent of its GDP (IMF, 2020). The biggest drops in 2020 were observed in the tourism, transportation, and communication sectors.

Indeed, it is already clear that COVID-19 will impact the tourism sector not only in 2020 and 2021 but also in 2022. Thus, long-term effects on tourism, linked sectors, and

economies are predicted. Fotiadis et al. (2021) find that tourist arrivals could drop to 76.3 per cent and last until at least June 2021. In a study on a group of 20 countries, Kourentzes et al. (2021) expect that under severe scenario assumptions, countries will recover on average to only 34 per cent of their total tourist arrivals in the last quarter of 2021 compared to the same period in 2019. Under a mild scenario assumption, the average recovery was 80 per cent. Polyzos et al. (2020) find that the recovery of Chinese tourists arriving at the pre-crisis level in the USA and Australia could take between 6 and 12 months.

More than 40 per cent of international tourism experts expect the global tourism sector to recover to its 2019 level in 2024 or later, with only 15 per cent of experts anticipating a recovery by 2022 (UNWTO Panel of Tourism Experts, January 2021). Moreover, it is likely that COVID-19 will modify the behaviours of tourists who may prefer to travel to familiar and trusted places. For instance, for China, Li et al. (2021) found that tourists avoided travelling to places with more confirmed cases of COVID-19 compared to their places of origin. This argument is relevant in Tanzania's case. Indeed, by refusing in 2020 to acknowledge the existence of the coronavirus in Tanzania, the previous government only fell behind in providing care and access to vaccination. It is possible that tourists will be afraid to return to Tanzania if only a small proportion of the population is vaccinated.

It is quite challenging to estimate a "back to normal" situation in the tourist arrivals, as most countries are experiencing a third or fourth wave of COVID-19. Therefore, we designed two scenarios: a mild scenario and a severe scenario. These two scenarios differ in the magnitude and duration of the shocks from 2021 onwards. However, for both scenarios, in 2020, the same magnitude is applied. Since based on observed data and we label the year 2020 as a "historical" simulation year. In the mild scenario, we estimate a return to normal in 2022, whereas in the severe scenario, the return to normal will be in 2023. The model runs from 2015 (year of the SAM), a so-called 'business as usual' scenario until 2030, without any shocks assuming a regular path of economic growth. The economic shocks caused by COVID-19 are applied in 2020 and 2021 for the mild scenario and in 2020, 2021, and 2022 for the severe scenario. When analysing the results, we compared the values obtained with the mild and severe scenarios to those of the "business as usual" scenario. We present the values obtained for 2020, 2021, and 2030.

For 2020, we computed the magnitudes of the shocks using the BOT (2020). For the scenario year 2020, information is available that remittances (inflows excluding those going to the government) dropped by almost 30 per cent compared to the business as usual scenario. It should be noted that for the scenario years 2021 and 2022, the simulated decreases in remittances are not based on official sources but on the authors' assumptions. Given the ongoing pandemic for 2021 and the coming years, official estimates of changes could not be researched. We assume in the mild scenario that the Tanzanian economy would continue to be affected but not as severely as 2020 and return to its business as usual situation in 2022. For the severe scenario, in 2021, the economy will still be heavily affected, and for 2022, we envisage that only a couple of sectors (mainly tourism and transport) would remain stricken. We assume that discovering new COVID-19 variants (such as Omicron) leads to preventive reactions from different countries that directly affect the tourism and transport sectors. The economy would return to its business as usual level in 2023.

Table 1
Scenarios implemented (in per cent to the business as usual scenario)

	2020[a]	2021		2022	
	Historical	Mild	Severe	Mild	Severe
Remittances	-29.5	-10		0	-5
World prices					
Oil	-32.8	15			
Mining (gold)	15	15			
Cotton	-7.6	-2			
Coffee	-5	-2			
Maize	-3	-2			
Rice	-3	-2			
Wheat	7.8	7.8			
Sugar	1	1			
Exports					
Traditional	-3.2	-2			
Coffee	-5.3	-2	-4		
Cotton	-4.6	-2	-4		
Sisal	-49.7	-5	-30		
Vegetable	-10.7	-5			
Fish	-16.9	-5	-10		
Textile	-30	-5	-10	0	-5
Hotel/Accommodation	-59	-35	-45	0	-25
Transport	-44.1	-25	-35	0	-15
Business services	-44.1	-25	-30	0	-10
Communication	-52.6	-25	-35	0	-10
Other services	-40	-25	-25	0	-10

Source: Authors' assumptions. Notes: a) The shocks in 2020 are based on observed data and applied to both the mild and severe scenario.

6. Results

6.1 The macroeconomic impacts

The COVID-19 related shocks are quite harsh in the Tanzanian economy. Indeed, as mentioned above, the effects on Tanzania are via a number of channels (e.g. drop in tourists, decrease in exports, differing world prices, and decreased remittances). In 2020, Tanzania experienced a decrease in GDP of 1.88 per cent. In 2021, in the mild scenario, the decline in GDP is slightly lower than in 2020, while under the severe scenario, Tanzania suffers a higher loss. In both scenarios, in the long run, GDP would still be lower than what it would have been without the pandemic, with a drop in GDP by 0.38 per cent in the mild scenario compared to 0.54 per cent in the severe scenario (see Table 2). The negative impact on economic growth caused by a contraction of the tourism sector, as well as trade shocks, is in line with studies describing the positive impact of tourism expansion (e.g. Njoya & Seetaram, 2018; Kweka, 2004). Since Tanzania's tourism sector was expanding until 2019 (WEF, 2019; Kyara et al., 2021), the negative shock caused by COVID-19 has created an inverted (negative) impact on growth. The macroeconomic impacts simulated for Tanzania are comparable to the results of other studies on COVID-19 impact on tourism (e.g. Leroy de Morel et al., 2020; Pham et al., 2021).

Table 2
Macroeconomic impacts, selected indicators (in per cent change to the business as usual scenario)

	2020	2021		2030	
	Historical [a]	Mild	Severe	Mild	Severe
Real gross domestic product	-1.88	-1.76	-2.18	-0.38	-0.54
Investment	-13.2	-5.82	-8.96	-0.09	-0.16
Total labour demand	-3.36	-2.65	-3.41	-0.15	-0.22
Household real Consumption	-5.07	-3.81	-5.01	-0.31	-0.43

Source: Authors' simulation results. Notes: a) The shocks in 2020 are based on observed data and applied to both the mild and severe scenario.

The drop in tourism demand, combined with the linked drop in transportation and communication services, forces sectors to reduce production and lay off workers. These sectors reduce their intermediate demand, which in turn negatively impacts other sectors. These results are consistent with the strong backward linkages described by Kweka (2004) and Adam et al. (2018). In contrast to these studies, Tanzanian tourism suffers a contraction, thus creating a negative impact on the growth of the strongly linked sectors. Consequently, we observe a drop in total labour demand from tourism and linked sectors by more than 3.3 per cent in 2021. This drop in labour demand impacts households by reducing their income and then their consumption, ceteris paribus. Households' real consumption decreases by 5.07% in 2020, and in the long run, for both scenarios, it is still below the level of the business as usual scenario.

6.2 Impacts on the tourism sector and other sectors

In 2020, given the massive reduction in travellers, the production of the tourism sector is declining by more than 13 per cent (see Table 3). The sector is laying off workers and is no longer attractive for private investment. The drop in production continues throughout the period under mild and severe scenarios. In the long run, production is still slightly below what

it would have been without the pandemic. We can point out that the sector hires again and attracts more investment at the end of the period in 2030. However, the investments in the current period will be effective as capital in the next period (i.e., after 2030). To reach the level of services, as would have been the case without COVID-19, policy measures (e.g., more investments) will be needed to stimulate the expansion of the tourism sector (e.g. more tourism activities to Tanzania) and more investments. Pro-tourism measures would indirectly support the recovery of sectors linked to tourism. The strong linkages between tourism and other sectors (Mayer & Vogt, 2016; Eric et al., 2020; Njoya & Nikitas, 2020; Suau-Sanchez et al., 2020) cause a decrease in the production of the linked sectors (see Table 4).

For instance, the transport sector faces a drop of 11.74 per cent of its production in 2020, and the decline continues even after the economy goes to its business as usual level. Note that under the severe scenario, the sector's production is almost as affected as in 2020, resulting in layoffs in the sector. These reduced labour demands from the transportation sector are in line with the inverted observations of Njoya and Seetaram's (2018) study, which describes the significant positive impact on tourism caused by expanding the transportation sector. For the construction sector, the drop in production is also linked to the drop in total investment (Table 2), thereby affecting investment goods such as construction commodities.

Table 3

Impacts on labour demand, investments, and production in the tourism sector (in per cent change)

	2020	2021		2030	
	Historical [a]	Mild	Severe	Mild	Severe
Labour demand	-24.10	-13.51	-17.00	0.23	0.33
Capital demand		-2.85	-2.85	-1.76	-2.44
Production	-13.55	-8.7	-11.17	-0.69	-0.95
Investments	-37.41	-21.18	-27.27	0.51	0.69

Source: Authors' simulations results. Notes: a) The shocks in 2020 are based on observed data and applied to both the mild and severe scenario.

Table 4

Impacts on labour demand and production of the tourism sector and linked sectors (in per cent change)

Sector	Year	Labour demand		Production	
		Mild	Severe	Mild	Severe
Transport	2020 [a]	-26.3		-11.74	
	2021	-15.59	-17.9	-8.44	-11.37
	2030	-0.3	-0.38	-1.54	-2.07
Construction	2020 [a]	-8.32		-6.3	
	2021	-4.36	-6.24	-3.65	-5.07
	2030	-0.03	-0.09	-0.3	-0.44
Retail	2020 [a]	-5.27		-3.42	
	2021	-3.16	-4.47	-2.46	-3.31
	2030	-0.12	-0.19	-0.45	-0.62

Source: Authors' simulations results. Notes: a) The shocks in 2020 are based on observed data and applied to both the mild and severe scenario.

6.3 Impacts on Tanzanian households

The analysis of household income shows that in 2020 and 2021, rich and poor households suffered a significant decrease in income. Among the poor households, the loss is almost uniform given the place of residence. Interestingly, wealthy urban households lose relative less income than their rural counterparts. This is because wealthy urban households are the only ones who receive capital income from mining. The increase in the world price for gold in 2020, therefore, benefits the richest urban households, which can compensate parts of for their losses. The findings are in line with the World Tourism Organization and International Labour Organization (2013), who revealed that during the economic slowdown, poor households tend to suffer more than households with high and middle income (World Tourism Organization and International Labour Organization 2013). In the long run, however, farming households, whether wealthy or not, perform better than the others. Njoya and Seetaram (2018), Kweka (2004), and Eric et al. (2020) note that under the positive development of tourism, the benefits for rural households are smaller than for rural households. This observation confirms the weaker dependency of rural households also on the negative development of the tourism sector.

Table 5
Impact on households' total income (in % change to the BAU)

Households	Year	Farming Households		Rural Households		Urban Households	
		Mild Scenario	Severe Scenario	Mild Scenario	Severe Scenario	Mild Scenario	Severe Scenario
Poor households	2020 [a]	-12.18		-12.67		-12.13	
	2021	-6.18	-8.81	-6.51	-9.25	-6.49	-9.17
	2030	0.05	0.03	0.01	-0.03	-0.16	-0.24
Middle income households	2020 [a]	-11.94		-12.59		-12.22	
	2021	-6.19	-8.73	-6.69	-9.42	-6.62	-9.35
	2030	0.00	-0.03	-0.07	-0.13	-0.21	-0.31
Wealthy households	2020 [a]	-11.66		-12.32		-7.96	
	2021	-6.05	-8.54	-6.54	-9.20	-2.50	-4.62
	2030	-0.01	-0.04	-0.05	-0.10	-0.06	-0.14

Source: Authors' simulations results. Notes: a) The shocks in 2020 are based on observed data and applied to both the mild and severe scenario.

Poor households recover better in rural than in urban regions because their income is derived from work in the primary sectors (e.g. agriculture, fishery, forestry), and thus are able to recover from pandemic crises independently from the tourism sector (Blake, 2008). This means that COVID-19 measures have hit Tanzanian society at all income levels, even at a comparable relative range. For poor households, the loss of income might have a bigger effect on their purchasing power; thus the impacts are much harsher for these households. The observation of the harder hit is in line with the findings of Damania and Scandizzo (2017), who find that a contracting tourism sector has the heaviest impact on extremely poor rural households caused by the increase in local currency value and the corresponding increase in local prices.

6.4 Comparison with other black swan events

The impacts of the COVID-19 pandemic on worldwide tourism are considered as the most devastating in the history of tourism (Aldao et al., 2020: 931, Gössling et al., 2021). Figures 2 a and b present the impacts of COVID-19 and other historical black swan events on Tanzanian tourism and the aggregate economy by selected economic indicators. The indicators "tourism arrivals" and "value-added of services" inform on the impact of disruptive events on the operation of the tourism sector. The indicator "labour force", "consumption", and "Real GDP" inform on the impact on the aggregate economy. The solid lines represent historical data from 2000 to 2020, and the other lines present simulated data based on our CGE simulations for 2020 to 2023. The dotted lines represent the hypothetical economic development without any disruptive events, i.e. the business as usual. We computed these data as the linear interpolation between the historical level in 2019 and 2030, which we simulated with the CGE modal according to the business as usual assumptions. The dashed lines represent the development in the mild and the severe COVID-19 scenarios. We compute these data by applying the relative change simulated by the CGE model to the historical data of the year 2019 as the last year before COVID-19.

The impacts cause by the COVID-19 pandemic exacerbate the historical black swan events. The 9/11 Attacks in 2001 and the 2003-SARS epidemic flatten the curve of tourist arrivals compared to the increasing trend from 2000 to 2002 (Aldao et al. 2021, Gössling et al., 2021). The 2008-2009 global economic crisis causes a drop in tourism arrivals and a slight decrease in the value-added of the service sector. However, the global crisis decreased consumption via other channels than tourism. The global economic crisis also causes changes in international markets and the exporting sectors (e.g., agricultural sectors and minerals) and prices (Ngowi 2010), spilling over to consumption. COVID-19 pandemic in 2019 reduces the tourism arrivals, which had been steadily increasing since 2000, by 80 percentage points. Compared to the business as usual, all macro-economic indicators drop in 2019 and approach the business as usual only after 2023. The COVID-19 pandemic has not only reduced the number of tourists arrivals and tourist operations, as it seems to be the case in the 9/11 Attacks and 2003-SARS crisis. In addition to tourism services, it significantly decreases GDP, consumption, and labour demand.

6.5 Ex-post comparison

For 2020 we obtain data for the historical development and the development simulated with the CGE model based on observed data. In Figure 2, the differences between the historical and the simulated data appear as a gap between the end of the solid line and the beginning of the dashed line. Table 6 compares the data numerically and presents a slight deviation between historical and simulated data of 1 to 3 percentage points. The underestimation of labour demand, private consumption and value-added of the service sector explain the overestimation of GDP. The CGE model underestimates the negative impact of COVID19 on sectors, consumption and labour market and consequently simulate a less negative impact for the economic development, i.e. the GDP. This ex-post comparison presents a relatively small deviation between simulated and historical results and thus a relatively good model-based reality replication. Thus, we assume the model results could deviate 1 to 3 percentage points for the other years. The application of CGE models to the COVID-19 crisis and the availability of historical data for recent years allow for ex-post analysis for many countries and models. To the best of our knowledge, we examined the first ex-post comparison on COVID-19 for a CGE model on COVID19 impacts in Tanzania.

Table 6
Ex-post comparison between historical and simulated development of the year 2000.

	Historical 2000	Simulated 2000	Deviation
	Percentage change compared to 2015		Perc. points
Real GDP	129.9	131.2	1.3
Labor Force	117.4	115.5	-2.0
Consumption	116.6	114.2	-2.4
Value Added Services	122.1	120.7	-1.4

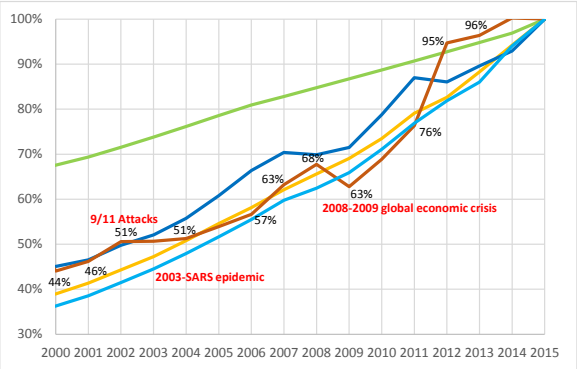

Figure 2 a. Historical development of indicators between 1999 and 2015. Per cent change with 2015 = 100%. Source: World Bank (2021b)

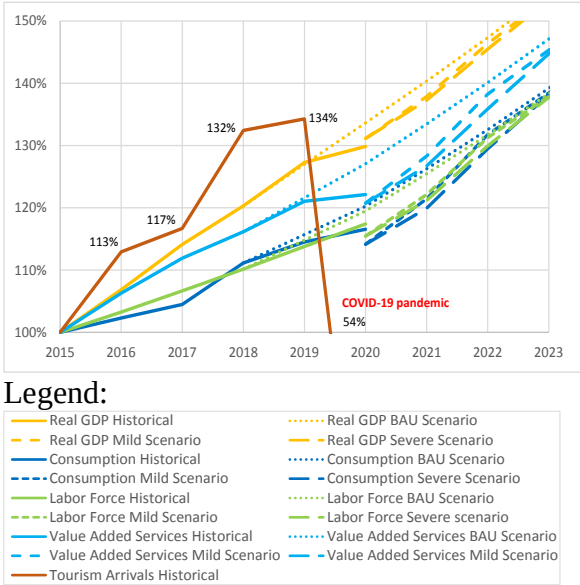

Figure 2 b. Historical development of indicators between 2015 and 2020 and simulated development for the mild and severe scenario. Per cent change with 2015 = 100%. Source: World Bank (2021b) and authors' computations.

7. Conclusions

The results presented in this study illustrate the significant impact of COVID-19 measures on the tourism sector and allied sectors in Tanzania. Without any policy measures in place, in the long run, GDP, production, and household income would still be below the baseline than would have been the case without the COVID-19 crisis. The comparison between the historical development of tourism and macro-economic indicators shows that the COVID-19 crisis exacerbates the impact of historical black swan events on tourism and economic development. The shocks via international and domestic channels create negative impacts in all Tanzanian sectors. The impact on the aggregate economy is much more substantial than observed in former black swan events.

The results suggest that policy measures focusing on supporting the tourism sector could be an important means to stimulate the Tanzanian economy after the COVID-19 pandemic. Such measures could, for example, be the development of hygienic concepts, improved infrastructure, and advertising to make tourism in Tanzania attractive for tourists after the pandemic (Kyara et al., 2021). The potential to expand nature-based tourism (Kweka et al., 2003; Sekar et al., 2014) could represent a competitive advantage compared to cultural tourism. In nature-based tourism activities, contact between people is less than that of cultural tourism, and the potential risk of infection is thus lower than that in mass tourism (e.g. holiday beach resorts).

Investing in road infrastructure could be a very interesting option: it would reduce transport costs for all the different sectors in the economy and encourage the growth of the tourism sector (see Kweka 2004; Adam et al., 2018; Eric et al., 2020). It would also respond to a recommendation from tourists, 42% of whom believe that roads and other infrastructure should be improved (NBS, 2018). Government and foreign investments could be channelled into building tourism infrastructure that could serve two objectives simultaneously: an improved infrastructure that could reduce transport costs and improve logistics. Investment in the construction sector in building infrastructure could help create new jobs and thus increase household income and domestic consumption to stimulate the economy. The dominant role of tour operators' foreign owners needs to be considered in counteracting measures. With governmental investments in tourism, foreign company owners could be engaged in boosting Tanzanian nature-based tourism, making it more competitive than in other countries after the COVID-19 pandemic (Ankoman & Crompton, 1990; Kinyondo & Pelizzo, 2015, Kyara et al., 2021).

Since the relative loss of income is high for both wealthy and poor households, political measures could find broad acceptance in both populations, notwithstanding that poor households are hit harder by income losses than wealthy households, and thus, the former might need different additional support. Further simulations of the impact on households by linking a micro-simulation model to the macroeconomic model could provide a more differentiated analysis of the impact of COVID-19 among households as well as different socioeconomic groups (e.g. women).

Tanzanian history has shown that government investments in tourism have been essential in the past, which could now be crucial in helping the recovery of the Tanzanian tourism sector, the economy, and households/residents. The findings from the Tanzanian case may also apply to other developing countries where tourism is an important economic driver. In addition, governments might need to take measures to help tourism and the economic growth of their countries.

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9. Annexe

Annexe 1-1: Description of method on extrapolating the historical data by using CGE model results

We scaled the development of World Band Development indicators relative to 2015 to display the historical indicators (INDHt) from 2000 to 2020 (Eq 1). In a second step, we simulate the post-COVID-19 years from 2020 to 2030 as simulated indicators (INDSt) (Eq 2). To project the post-COVID-19 development, we use the last pre-COVID-19 year as the base and apply a projection factor (PROJt). This projection factor is computed based on the CGE model results as a relative change compared to the last pre-COVID19 year (i.e., 2019) (Eq. 3). For 2020 we obtain two values: one historical value for the indicator (INDH2020) and one simulated value for (INDS2020). The values from the CGE model are percentage change related to the base year of the CGE model (i.e., the year 2015) (Eq. 4). Finally, we simulate the business as usual scenario (BAUSt) as a linear interpolation between the CGE model result for the year 2030 and the last pre-COVID19 year (Eq. 5 and 6).

(Eq 1) $INDH_{PreCOVID} = WOBAINDI_{PreCOVID} / WOBAINDI_{2015}$

(Eq 2) $INDS_{PostCOVID} = WOBAINDI_{2019} * PROJ_{PostCOVID}$

(Eq 3) $PROJ_{PostCOVID} = CGEMPERC_{PostCOVID} / CGEMPERC_{2019}$

(Eq 4) $CGEMPERC_{PostCOVID} = CGEMABSO_{PostCOVID} / CGEMABSO_{2015}$

(Eq 5) $BAUSINDI_{BAU} = INDI_{BAU} + DILI_{BAU}$

(Eq 6) $DILI_{BAU} = [(CGEMPERC_{BAU2030} - INDI_{2019}) / 21]$

With

INDIt = macroeconomic indicators for the year t relative to 2015

t = {2000, …., 2030}

PreCOVID = {2000,…,2030}

PostCOVID = {2020,…,2030}

SBAU = {2019,…,2030} = 21 years

$WOBAINDI_t$: macroeconomic indicators for the year t provided by the World Bank Development indicators (WB 2021)

$PROJ_t$: factor for projecting the last pre-COVID19 year (i.e., 2019) as post-COVID19 year

$CGEMPERC_t$: macroeconomic indicator for the year t from the CGE model simulations relative to the CGE model results for the year 2015 (i.e., the base year 2015).

$CGEMABSO_t$: macroeconomic indicator for the year t from the CGE simulations as a ratio to the CGE base year 2015

$SBAUINDI_{BAU}$: Simulated Business As Usual

$DILI_{BAU}$: Difference for linear interpolation between the t= BAU = {2019, …, 2030}