Are Sectors Hit Equally by Covid – 19 Pandemic? Some Insights from Assessing the Economic Impacts of the Pandemic on Selected Sectors in Tanzania

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Abstract

This study uses Input-Output modelling technique to analyze the impact of COVID 19 across different sectors of the economy. This type of modeling takes into account the inter-sectoral impacts of different types of exogenous "shocks" to an economy. The sectors that were assumed to be hard hit are used to determine the impact of COVID 19 and these include transport, wholesale and retail trade, financial services and manufacturing with varying scenarios. Findings show that while the pandemic will affect economic growth, the highest contributors of the overall shocks to GDP are accommodation (-TZS 632 Bill), financial services (-TZS 381 Bill), electricity supply (-TZS 211 Bill), manufacturing (-TZS 175 Bill) and agriculture and livestock (-TZS 114 Bill) respectively. Also, shocks in the manufacturing sector had more effect in absolute terms and in the number of other sectors it has affected. Only financial and accommodation services experienced positive effects, the rest experienced negative effects. In addition. all the analyzed sectors (i.e. manufacturing, retail trade, accommodation and transport), the effects in respective sectors affect financial services positively, partly on account of increased need for more financial supports for most hardly hit sectors. We also note that while the pandemic shocks are likely to have significant adverse impacts on the economy not all sectors will end up being negatively affected by shocks, some sectors such as ICT, financial sector, the health-related goods and some services sectors may benefit from the shocks. These results imply that since manufacturing and transport sectors have higher multiplier effects and more forward or backward linkages, then any government fiscal stimulus packages should deliberately focus on these sectors.

Key Words: COVID 19; Impact; Sectors; I-O Model; Pandemic; Tanzania
JEL Classification Codes: R15

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1. Introduction and rationale

The COVID-19 pandemic and the associated economic crises are posing huge challenges, raising many unknowns and imposing wrenching trade-offs in the global economy at a rate humanity has never witnessed before. UNDP (2020) asserts that both crises are global, but their impacts are deeply local and thus, the policy response to both crises needs to be rapid, even if it is rough around the edges. But countries cannot pull this off on their own as in essence the global crises require global solidarity and coordination as the pandemic has disrupted economic activities across the globe. The virus, has not spared Sub-Saharan either and Tanzania in particular, as it has spread so quickly across borders despite its late arrival.

According to World Bank (2020) study report, it is projected that economic growth in Sub-Saharan Africa (SSA) will decline from 2.4 percent in 2019 to -2.1 to -5.1 percent in 2020, the first recession in the region in 25 years. The report estimates that it will cost the region between US$37 billion and US$79 billion in terms of output losses for 2020. The downward growth revision in 2020 reflects macroeconomic risks arising from the sharp decline in output growth among the region's key trading partners, including China and the euro area, the fall in commodity prices, reduced tourism activity in several countries, as well as the effects of measures to contain the COVID-19 global pandemic.

The projections by World Bank are not very much different from those made by the International Monetary Fund Sub Saharan Africa Economic Outlook report (2020). The report says that, the region's economy is projected to contract by −1.6 percent this year being the worst reading on record, a downward revision of 5.2 percentage points from our October 2019 forecast. Across countries, the less diversified economies will be hit the hardest, reflecting the impact of lower commodity prices and containment efforts. Among the non-resource-intensive countries, those that depend on tourism are expected to witness a severe contraction because of extensive travel restrictions, while emerging market and frontier economies will face the consequences of large capital outflows and tightening financial conditions. The IMF (2020) noted that in non-resource-intensive countries, growth is expected to slow but remain positive. In particular, in the East African Community due to weak external demand and disruptions to supply chains and domestic production. Finally, activities in tourist-dependent countries is expected to contract sharply in response to severe disruption to travel and tourism activities.

Despite the recent impressive economic and social progress achieved in the last two decades, growth in most African countries and Tanzania in particular remain characteristically fragile with the onset of COVID – 19 pandemic. This inherent fragility extends across the economic, social, political and cultural fabrics of life in Africa. In Tanzania, several containment measures were implemented including closing of schools, undertaking social distancing rules and closing the borders for international flights. These measures were implemented up to June 2020 in which the government of Tanzania relaxed some of the measures and allowed normal continuation of the production processes. The opening of production operations is important at mitigating the COVID-19 effects.

Recently, the government of Tanzania made decisions to relax some measures, however, operations by most sectors' economic agents are still not at full employment. Also some sectors had already been hardly hit by the pandemic by the time the government relaxed some of the

restrictions. Therefore, there is still a need to know in the first place, which sectors have been affected most, any existence of forward and backward linkages among the sectors, and to what extent. Knowing these will help the government to design strategies and policy instruments that will ensure a swift response to the ensuing COVID – 19 pandemic economic impacts. In this study, we make use of the Tanzania's Input-Output Tables (2015) to conduct such sectoral analysis as they have the ability to focus on the interrelations and flows that occur among sectors of the economy. We complement our analysis of I-O model by estimating and forecasting the magnitude of the resulting future impacts of the selected sectors using the MACMOD model for Tanzania. Moreover, to the best of our knowledge, no study on Tanzania has estimated the impacts of any crisis using the updated I-O model for Tanzania.

To understand the effects, this study simulates the effects of shocks in accommodation, retail trade, financial, manufacturing and transport sectors in the overall GDP. When considering aggregate effects in which sectoral effects balance themselves, our results in terms of the pandemic effects on overall growth do not differ much with government estimates, which indicate robustness of our approach. The study finds also that when considering partial effects, in which effects to total GDP emanating from shocks in other sectors other than the one in consideration are held constant, shocks in manufacturing sector has more individual impacts than the rest of the sectors under consideration, followed by Transport sector, retail trade sector and then financial sector. These results imply that since manufacturing and transport sectors have higher multiplier effects and more forward or backward linkages, then any government fiscal stimulus packages should deliberately focus on these sectors if the government needs to reverse the growth trajectory post-COVID 19. The rest of the paper presents the literature review, methodology, results and conclusions respectively.

2. Literature Review and conceptual framework

Modeling the channels of transmission of the global financial crisis to countries conceptually envisage an open economy framework in which an economy is being hit by the crisis through a variety of real and financial channels. In order to establish the impact in the economy, we base the analysis on general equilibrium theory, which indicates that there exists a set of equilibrium prices to make all the markets realize equilibrium simultaneously. Thus, when all the markets reach equilibrium, demand equates supply in each market simultaneously. Modelling the whole economy takes into account economic relationships, direct effects and feedback effects between different economic agents such as industries, households, government and production factors. In such a framework, the short run dynamics depend on countries' structural characteristics, their initial position and vulnerabilities, and macroeconomic policies. While the existing financial and trade linkages shape the transmission of the shock from other economies, the extent to which it gets amplified in turn depends on existing domestic financial vulnerability and the response of monetary and fiscal policies. Then to establish this effect and how it translates within the economy entails estimating the inter-sectoral impacts of different types of exogenous "shocks" to an economy. These shocks translate into a change in final demand such as an increase (or decrease) in expenditure by the affected sector and tracing the effects of this change through an economy, with each expanding (contracting) sector's demands for intermediate products and other induced demands such as changes in household and government expenditures leading to further expansion (contraction) in other sectors.

There is rich literature evaluating the impact of crisis on different sectors of the economy. Most of these literatures have concentrated on evaluating the effects of the 1997 Asian crisis and the 2008 financial crisis. Sectors that attracted the attention of many researchers include analyzing the impact of the crisis on tourism and financial sectors. With regards to COVID 19, though there are paucity of data, some researchers have started making a quick analysis of the impacts. For instance, Jones et al (2020) shows that COVID19 has affected economies differently with some of the sectors benefiting while others being negatively hit, with the most hit areas including transport due to restrictions on travels and health and technology have benefited on account of continued investment in determining vaccine, and production of health equipments while working from home has improved the communication sector.

Jayaram *et al.,* (2020) proposes different scenarios for Africa's growth in the wake of COVID-19, that however explicitly do not take into account either fiscal stimulus packages or currency devaluations. The study uses a revenue approach in estimating the impact of COVID-19 on GDP growth rates in Africa, for 2020 only. The analysis found that the 2020 growth estimate for Africa will drop from 3.9 percent to 0.4 percent. Breisinger *et al.,* (2020) uses the SAM multiplier model for Egypt to assess the pandemic's economic impacts for Egypt. The study simulates the individual and combined effects of a collapse in the tourism sector and reductions in Suez Canal revenues and in foreign remittances. The study found that household income, especially for the poor, will be hard-hit, linked to disruptions in tourism and declining remittances. McKibbin & Fernando (2020) simulate using a hybrid of dynamic stochastic general equilibrium (DSGE) models and computable general equilibrium (CGE) models, a global economic model to explore seven scenarios regarding the spread of COVID-19. The study found that although efforts are made to contain COVID-19 by governments still in the short run the outbreak could significantly impact the global economy.

A rapid socio-economic assessment impact of COVID 19 in Tanzania was carried out by ESRF (2020) and attempted to assess impact on the immediate and near-term macro-outlook, livelihoods both at individual and household level. It covered sectors that are at a higher risk of being affected by the pandemic such as tourism and hospitality industry, transportation and storage industry, agriculture (crop, livestock and fisheries), wholesale and retail trade. Finance and insurance, and social sector (health and education). Given the nature of the disease, Tanzania restricted the movement of people from COVID 19 countries as a measure to control the spread of the virus including arrivals from affected countries. This led into the restriction of any international passenger landing in Tanzania. This led into reduced number of tourists' flows with depressed hotel activities including closure of hotels. In fact, activity in tourist-dependent countries is expected to contract sharply in response to severe disruption to travel and tourism activities (World Bank, 2020). The effects emanating from the pandemic are mostly felt by business owners who lost incomes from business closure, individuals lost both incomes and employment opportunities. Likewise, due to the restricted movement of people across borders, transport sector was equally affected especially road, marine and air transport. The measure adapted to curb the spread of the disease increased operational cost for bus operators while airlines, airports and airport cargo handling companies experienced sharp declines in revenues due to reduced traffic. Other sectors that experienced reduced business flows included wholesale and retail business as well as agriculture. The sectors experienced reduced earnings from exports due to declining export orders for commodities particularly from countries outside the East African Community (EAC) and South

Africa Development Community (SADC) trading blocks. Mold and Mveyange (2020) noted that the World Trade Organization (WTO) forecasts the volume of global merchandise trade will be falling everywhere between 13 percent and 32 percent in 2020. Being part of the global business community, Tanzania cannot be spared either. Consequently, due to reduced business transactions, the financial sector was also affected with increased non-performing loans by both large corporate borrowers, SMEs and micro credit clients.

Another assessment of the agricultural sector in Tanzania by the Tanzania Horticultural Association (2020) for the horticulture subsector shows that the subsector has been growing at an average of 11 percent per annum while contributing nearly 43 percent of foreign exchange earnings. Most of the horticulture products are sold into regional and global markets. However, with the onset of the pandemic, restricted travel and lockdowns in most parts of the world especially in Europe, Asia and America, the demand for the products particularly flowers has fallen by nearly 50 percent. This is partly attributed by the fact that such products have very low demand or lack demand completely in the domestic market. This has also affected employment of more than 4 million people mostly women and youth who depend on the subsector for their livelihoods. In the East African Region, the East African Business Council (EABC, 2020) conducted a survey to establish the impact of COVID 19 on businesses. The survey established that tourism, logistics, and retail trade have significantly experienced a higher percentage of reduction of cash flow of 92 percent, 75 percent and 63 percent, respectively. It also established other sectors affected including: Real estate, Finance, construction, Events management, ICT, manufacturing and consultancy. However, the Pharmaceutical sector has recorded zero effect on cash flow mainly due to the fact that the COVID-19 pandemic led to the increase in demand for pharmaceutical products as well as decisions of EAC Partner States to allow movement of essential goods such as pharmaceutical businesses during this pandemic.

Since, we have seen various studies assessing the COVID 19 impact on various sectors of the economy across countries and Tanzania in particular, we expect to see significant impacts on economic growth trajectories and people's livelihoods as well. To this end, a World Bank (2020) study projected that economic growth in Sub-Saharan Africa would decline from 2.4 percent in 2019 to -2.1 to -5.1 percent in 2020, the first recession in the region in 25 years thereby costing the region between US$37 billion and US$79 billion in terms of output losses for 2020. According to the study, the downward growth revision in 2020 reflects macroeconomic risks arising from the sharp decline in output growth among the region's key trading partners, including China and the euro area, the fall in commodity prices, reduced tourism activity in different countries, as well as the effects of measures to contain the COVID-19 global pandemic. It also noted that, countries that depend on oil exports and mining would be hit the hardest with growth expected to fall by up to 7 percentage points in oil-exporting countries and by more than 8 percentage points in metals exporters compared with the no-COVID base case. On the other hand, in non-resource-intensive countries, growth is expected to slow down but remain positive with growth likely to weaken substantially in the two fastest growing areas—the West African Economic and Monetary Union where outbreaks are spreading rapidly and the East African Community—due to weak external demand and disruptions to supply chains and domestic production.

From the growth impacts by the World Bank study, another study by Sumner, Hoy, and Ortiz-Juarez (2020), made estimates of the potential short-term economic impact of COVID-19 on global

monetary poverty through contractions in per capita household income or consumption. The estimates were based on three scenarios: low, medium, and high global contractions of 5, 10, and 20 per cent. They calculated the impact of each of these scenarios on the poverty headcount using the international poverty lines of US$1.90, US$3.20 and US$5.50 per day. The study findings show that COVID poses a real challenge to the UN Sustainable Development Goal of ending poverty by 2030 because global poverty could increase for the first time since 1990 and, depending on the poverty line, such increase could represent a reversal of approximately a decade in the world's progress in reducing poverty. In some regions the adverse impacts could result in poverty levels similar to those recorded 30 years ago. Under the most extreme scenario of a 20 per cent income or consumption contraction, the number of people living in poverty could increase by 420–580 million, relative to the latest official recorded figures for 2018. From these studies, we find out that COVID 19 impacts are real and affecting livelihoods across countries and regions around the world. Thus, to be precise, we opted to make use of the latest input-output table 2015 for Tanzania to try to gauge the impact of the pandemic on selected sectors of the economy and economic growth at large.

3. Methodology; Analytical and Theoretical Frameworks

Estimation of the economic impact of changes in the demand for various sectors has been estimated using the input-output (I-O) analysis. In terms of methodology, both qualitative and quantitative research methods have been applied to studies on economic impact of crisis. However, those that quantifies the effects uses quantitative methods by invoking econometric models, social accounting matrix (SAM) models, I-O models and CGE models. Blake and Sinclair (2003) and Blake *et al.*, (2003) uses CGE modelling to study the impact of the September 11 crisis on tourism and analyze the effects of foot and mouth disease on tourism respectively. McKibbin & Stoeckel (2009) uses the dynamic stochastic general equilibrium model to estimate the impact of the global financial crisis on various sectors. Wyer *et al., (*2003) uses the multi-regional CGE model for Australia to explore whether there were any differences in the economic impacts on a host destination of expenditure from different origin markets. Li *et al*., (2010) using CGE evaluates the magnitude of economic impact of the economic slowdown on China's tourism.

Other studies uses Input-Output (I-O) models to estimate the impact of crisis on various sectors. Yuan et al., (2010) on China using I-O model estimates the impact of the financial crisis on economic growth and energy consumption. Archer and Fletcher (1996) uses I-O to estimate the economic impact of changes in the demand for tourism on incomes, employment, public sector revenue and the balance of payments in the Seychelles.

According to Koks *et al.*, (2015) econometric models, based on time-series data, are used on account of their rigorous statistical and predictive skills but challenged since they can only provide estimates of the total (aggregated) impacts. SAM models, which are very similar to IO models, measures the indirect effects throughout the system of different economic agents but are rarely applied since they are not often constructed by national bureaus of statistics. In most literatures, IO and CGE are the most commonly applied models to assess the economic impact of disasters. As highlighted above, owing to the availability of the updated I-O table for Tanzania, this study estimates the impact of COVID-19 to changes in final demand of selected sectors. To complement the results, a MACMOD for Tanzania is used to forecast the magnitude of future final demand in the selected areas. The selected sectors include tourism and accommodation, transport,

manufacturing, retail trade and financial sectors. These sectors are considered to have more forward and backward linkages. To the best of our knowledge, no study on Tanzania has estimated the economic impact of any crisis using the updated I-O model for Tanzania. This study fills that gap.

I-O modeling takes into account the inter-sectoral impacts of different types of exogenous "shocks" to an economy. To achieve these estimations, a number of assumptions, such as fixed prices and wages, need to be made. Prices are assumed to be constant because wage rates do not change, and also because of the simple production and competitive structures inherent in I-O models. In reality, however, wages and prices do change[1] when an economy adjusts to a substantial shock, so these effects will be taken into consideration by using some flexible I-O models. I-O model traces final demand shocks through the Gross Domestic Product (GDP). Demand shock is an economic term which describes a sudden increase or decrease in demand for goods. Given the lack of detailed data on the sectoral impact of the crisis, the sectoral analysis will be based on logical assumptions related to the nature of each sector and the degree of sector vulnerability to previous severe crises that were different in nature, and certainly less severe than the current crisis. An input-output (IO) table contains the valuable information about the market allocation of resources in an economic system. Based on I-O, several general economic equilibrium models can be created and analyzed, both in static and dynamic settings.

In the rows of the I-O table, there are two equilibrium equations that can be represented. On the basic equation, there is the I-O model indicating the production in an economy and its dependency on inter-sectoral relations and final demand. For sector I, the equation representing these relations is:

$$(1)\ \sum_{j=1}^{n} x_{ij} + y_i = x_i,$$

where x_{ij} is the intermediate use, y_i is the final demand, and x_i is the total output. Assuming $a_{ij} = \frac{x_{ij}}{x_j}$, then a_{ij} is called technical coefficient of production defined as purchases that sector *j* makes from sector *i* per total effective production unit of sector *j* representing the direct input required by sector *j*. In matrix notation and for the economy as a whole, equation (1) can be written as:

$$(2)\ AX + Y = X,$$

and A in equation 2 is called the direct input coefficient of I-O matrix. Solving for X we obtain the total production as

$$(3)\ X = (1 - A)^{-1}Y,$$

where $(1 - A)^{-1}$is known as Leontief Inverse Matrix. X represent the total production in terms of both the direct and indirect input that every sector must produce to satisfy the final demand of the economy.

[1] Some workers who become unemployed as a result of a shock take up lower-paid employment in other sectors of the economy.

$b_{ij}$the elements in the matrix $(1-A)^{-1}$ are the increases in production generated by sector i if the demand for sector j increases in one unit. For a specific sector the equation:

(4) $\sum_{j=1}^{n} s_j + s_y = s,$

where s_j is the sectoral consumption by sector j, s_y is the sectoral consumption by the final demand, and s is the total sectoral consumption. Assuming $d_j = {}^{s_j}/_{x_j}$, then d_j is called the technical coefficient of sectoral consumption. They are defined as purchases that sector j makes from selected sector per total effective production unit of sector j, and which represent the direct sectoral consumption by sector j. In matrix notation,

(5) $DX + S_y = S,$

where $D = [d_1, d_2, \ldots\ldots, d_n]$, and $X = [x_1, x_2, \ldots\ldots, x_n]$,

D is called the direct sectoral consumption matrix. This then can be:

(6) $D(1-A)^{-1}Y + S_y = S,$

where $D(1-A)^{-1}Y$ is the sectoral consumption by the production of sectors, S_y is the household sectoral consumption and S is the total sectoral consumption.

3.1 Data Used

The input- output table (I-O table) for Tanzania Mainland of base year 2015 which was calculated based on 2015 Supply and Use Tables which provide the framework for estimating GDP by both the production and expenditure accounts of the economy using the rebased and benchmarked National Accounts are used. This table is built from the 1992 and 2007 I-O Tables which were deemed to be overtaken by both time and events. The latest version of MACMOD for Tanzania is also used, whose elasticities were updated in 2019. The other data required was collected from various publications developed by the National Bureau of Statistics, Bank of Tanzania and the Tanzania Revenue Authority.

3.2 Approach and assumptions

In order to clearly understand the impact of COVID-19 on various sectors, the analysis in this study examined the effects of the pandemic across different sectors in the country. The sectors that were assumed to be hardly hit are used to determine the impact of COVID 19 and these include transport, wholesale and retail trade, financial services and manufacturing. The current I-O Table is disaggregated into 67 sectors, but due to time and financial resources and to facilitate data collections, the tables were collapsed into the sectors as currently reported in the national accounts data. Thus, in our analysis, the harmonization with the current reporting of national accounts has resulted into a new I-O Table with 18 sectors namely:

i. agriculture, hunting and related services;
ii. Fish and other fishing products; aquaculture products;
iii. support services to fishing; forestry, logging and related services;
iv. Mining and quarrying;

v. Manufacturing;
vi. Electricity Supply;
vii. Water Supply, sewage and waste management;
viii. Construction;
ix. Wholesale and retail trade, repairs;
x. Transport and storage;
xi. Accommodation and Food services;
xii. Information and Communications;
xiii. Financial and insurance services;
xiv. Real estate and business service;
xv. Public administration and defense services, compulsory social security services;
xvi. Education services;
xvii. Human health and social work activities; and
xviii. Other social and personal services.

Given that, at the time of undertaking this study, national accounts official statistics in Tanzania only existed up to year 2019, projections for national accounts figures for our baseline status quo scenario for 2020 estimates were made using the latest version of MACMOD. The latest MACMOD Version considers the implications of the recent rebasing of National Account statistics which culminated into several changes, including changes in the structure and size of GDP and changes in the ratio of various indicators to GDP. It also uses the new elasticities which are used in establishing the relationship among macroeconomic accounts. The baseline status quo scenario assumes that there was no interruption of growth throughout the economic crisis.

For comparability, we could not use the Government estimates on account of differences in how projection assumptions are made. The estimates obtained from MACMOD were used to calculate the final demands used in our I-O Model and later used as the basis for the final projections of the effects of COVID-19 to the economy and for other comparisons.

All the estimates were done by optimistically assuming that except for the selected sectors in which the pandemic effect was expected to persist for a year, the rest of the sectors the pandemic were assumed to have little effect and if any it was regarded that will not affect and not change the within currently observed financial, demand and income effects. The estimates may be affected if the pandemic is not contained within the thought timeframe. Thus, the pandemic effect is then computed as the difference between potential GDP with and without COVID-19 effects (the baseline status quo scenario). On sector by sector, the following were the basis of estimates:

i. The final demand was estimated by subtracting import values from the 2019 sector values.
ii. Sector behaviors are assumed to be the same as it was in 2015, and this allows us to use the 2015 transaction table.
iii. We assume accommodation to be affected by 65% basing on the Ministry of Industry and Trade (MNRT) (2020) report since containment has occurred before December. This assumption emanates from the fact that accommodation is much affected by the trend of tourism activities in the country. According to MNRT (2020), due to COVID-19, the country should expect the total number of international tourists arriving in the country to decline from 1,867,000 to a range of between 654,000 tourists (a 65-percentage decline) and only 390,000 tourists (79 percentage decline) depending on whether the containment

happens as early as July, 2020 or as late as December 2020, respectively. Also, cancellations of trips and banning of public events has affected the accommodation sector. World Travel and Tourism Council (WTTC) further reports that tourism industry which currently accounts for 10% of global GDP, could take up to 10 months for the industry to recover once the outbreak is over.

iv. The crisis has severely affected transport services, both in terms of supply and demand. The market for air travel has collapsed with a significant portion of the world's airline fleet grounded. Working from home had also some effects on domestic ground public transport. Then apart from air transport, we assume that the rest of transport modes were assumed not to be affected. While passenger transport is mainly driven by the disposable income of consumers, freight transport is in particular dependent on trade activity and since trade activity was not much affected by ground transport which was not much affected by ban, then the effect is mainly considered to be accounted by air transport. According to the 2019 national accounts, air transport contributes about 34% of the transport and storage sector, and thus since the sector was almost totally grounded, we estimate an effect of 90% in air transport which translates into 31% effect in the transport and storage sector.

v. Retail which according to the 2019 national accounts contributes about 43% of wholesale and retail trade, as per Tanzania National Business Council (TNBC) (2020) report is assumed to be affected by 63%. Working from home had also some effect on domestic retail businesses. Also, most of the retail businesses in Tanzania depends on imported products from China and other foreign countries. However, global lock-down, border closures that prevent thousands of businessmen from going to cross-border markets during the lock-down period and grounding of air transport would not allow retail businesses to source their products outside the country hence affecting the trading process as a whole. Also, according to Ndosi (2020) one percent of businesses in Tanzania have gone into total shutdown and about 40 percent of businesses have experienced loss of half of their income and 10 percent have experienced total loss.

vi. As per TNBC (2020), manufacturing is assumed to be affected by 36%. The sector is also sensitive to internal and external factors that affect the value chain of the production processes from sourcing raw materials to storage and selling of the final products. The sector is affected by different sub-sectors including factories, warehouses and transporters, as well as farms, which may be forced to stop production.

vii. As per TNBC (2020), financial sector is affected by 50%. Kroszner et al. (2007) studied the mechanisms linking financial shocks and real economic activity, by investigating the impact of banks on the provision of credit and liquidity to firms during times of banking distress in which it is found that such shocks do not generate a growth effect on financial industry.

4. Results and discussions

Using an I-O Model for Tanzania, we simulated both individual and combined effects of a shock in the selected sectors under the above said assumptions. The demand shocks is taken as the anticipated reductions in accommodation, manufacturing, transport, retail and financial sectors.

We therefore made simulations and 2020 macroeconomic forecasts. Our forecast indicates that the GDP in 2020 would grow by 7.2 percent which slightly differs from government estimates of 7.1 percent (see Table 1). As said before, the differences arise on account of differences in assumptions used in obtaining the final demand. The government estimates are derived using the

MACMOD 2019 version while our GDP is derived using I-O accounts although using the final demand that was estimated using the 2019 GDP figures. Slight differences in the figures provide evidence of robustness of the methods used and that allowed for further estimations of the effects using the I-O Model. The highest contributors of the overall shock are accommodation (-TZS 632 Bill), financial services (-TZS 381 Bill), electricity supply (-TZS 211 Bill), manufacturing (-TZS 175 Bill) and agriculture and livestock (-TZS 114 Bill) respectively. According to IMF, Tanzania's economic growth was projected to decline from 6.9 percent in 2019 to 2 percent in 2020 while the Economic Intelligence Unit of London estimate growth to drop to 2.7 percent (around 61 percent reduction).

Table 1: GDP Estimates with and without COVID-19 Effects (TZS Billions)

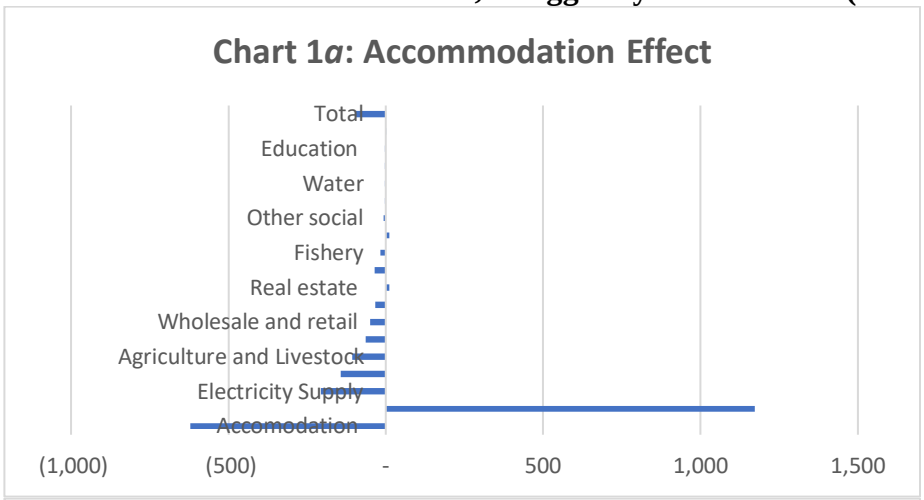
	INDUSTRIES (ISIC Rev.4)	GDP Government Estimates		GDP Authors Estimates						
No		**Without COVID 2019**	**Without COVID 2020**	**Without COVID 2020**	**With COVID Accommodation**	**With COVID Transport**	**With COVID Retail Trade**	**With COVID Manufacturing**	**With COVID Financial Services**	**Overall COVID Impact**
1	Agriculture and hunting	25,773	27,178	20,973	20,866	20,901	20,946	20,319	20,978	20,859
2	Forestry and logging	4,001	4,188	4,577	4,513	4,573	4,575	4,570	4,582	4,512
3	Fish and fishing	2,856	3,034	2,717	2,699	2,713	2,716	2,692	2,718	2,699
4	Mining and quarrying	5,350	5,521	5,714	5,679	5,675	5,674	5,674	5,679	5,677
5	Manufacturing	10,957	11,877	22,990	22,847	22,506	22,823	18,253	22,980	22,815
6	Electricity Supply	1,485	1,567	1,966	1,760	1,746	1,737	1,737	1,764	1,754
7	Water Supply and sewage	1,024	1,087	632	630	630	629	629	632	630
8	Construction	18,092	20,429	14,028	14,026	13,992	13,989	14,009	14,025	14,020
9	Wholesale and retail	11,534	12,189	11,429	11,380	11,134	9,442	11,241	11,415	11,368
10	Transport and storage	9,914	10,642	10,999	10,964	7,571	10,805	10,842	10,975	10,946
11	Accommodation and Food services	2,190	2,290	2,237	1,616	2,214	2,231	2,284	2,287	1,605
12	Information and Communications	2,704	2,937	3,956	3,968	3,945	3,924	3,951	3,948	3,941
13	Financial and insurance services	4,705	4,889	7,045	8,218	8,112	8,130	8,170	6,684	6,664
14	Real estate and business services	8,205	8,847	8,676	8,687	8,597	8,493	8,601	8,654	8,637
15	Public administration and defense services	5,806	6,044	5,737	5,736	5,732	5,720	5,733	5,736	5,735
16	Education services	3,787	4,056	3,679	3,679	3,668	3,673	3,677	3,678	3,678
17	Human health and social work activities	2,405	2,575	2,028	2,028	2,028	2,028	2,028	2,028	2,028
18	Other personal services	2,167	2,369	2,456	2,449	2,434	2,444	2,453	2,455	2,446
19	**GDP at market prices**	**122,954**	**131,718**	**131,840**	**131,744**	**128,169**	**129,977**	**126,863**	**131,219**	**130,013**

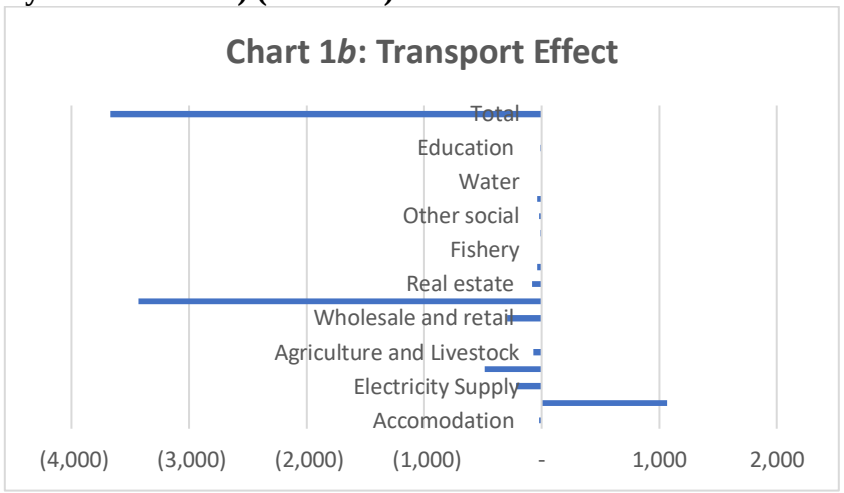
Considering the partial effects (Table 1 and Chart 1), the shocks in one sector are observed to have negative spillovers often extending to other sectors of the economy. In the analysis, shocks in the manufacturing sector had more effect in absolute terms and in the number of other sectors it has affected. Only financial and accommodation sectors were positively affected, the rest experienced negative effects. The positive spillovers created by manufacturing sector in accommodation and financial sectors partially offset the negative spillovers that are experienced in all other sectors and that is why the total effect is found to be negative. Financial sector had positive effects to agricultural related sectors and accommodation, but as for the effects of manufacturing, the negative spill-over is very dominant.

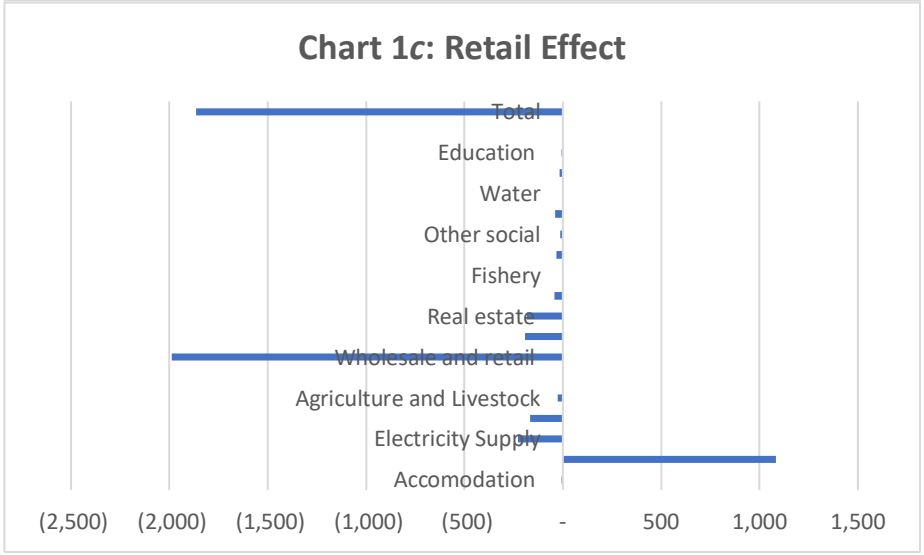
In all the analysed sectors (i.e. manufacturing, retail trade, accommodation and transport), the effects in respective sectors affect financial services positively, maybe on account of increased need for more financial supports for most hardly hit sectors. Bartik et al (2020) indicates that small businesses in the US are financially fragile with median businesses having only about 2 weeks of cash on hand at the time of the survey hence planning to seek funding from recovery aid. In Tanzania since there any recovery aid set by the government, we expect the shock to be felt in the financial sector.

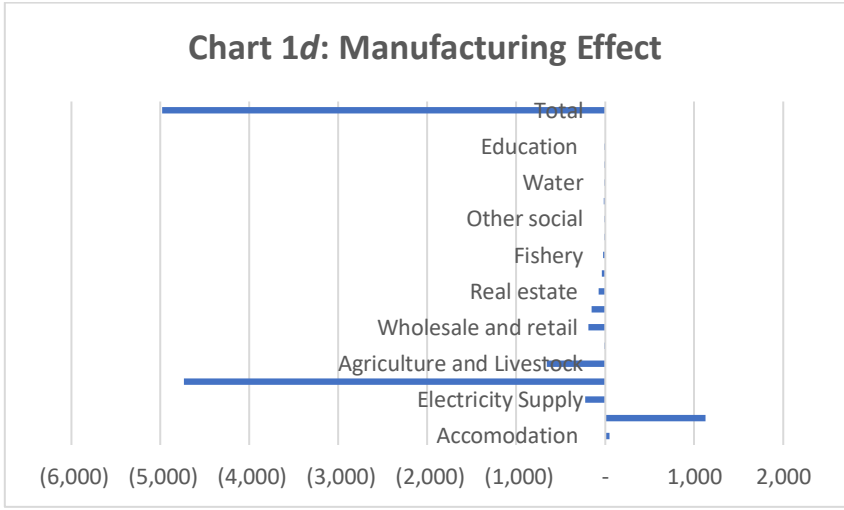
Looking at sector by sector analysis, shocks in manufacturing sector turned out to have higher negative impacts to agriculture sector when compared to the resulting impacts in other sectors other than the manufacturing sector itself. It is understood that there was importation issues and staffing deficiencies stood for many businesses due to disruption to supply chains and self-isolation policies and these affected manufacturing sector which uses agricultural products as raw materials. For many roles within a manufacturing company, *'working from home'* is not a viable option.

Chart 1: Estimated GDP Loss/Gain, disaggre by source of loss (Sector by Sector Effects) (Bill TZS)









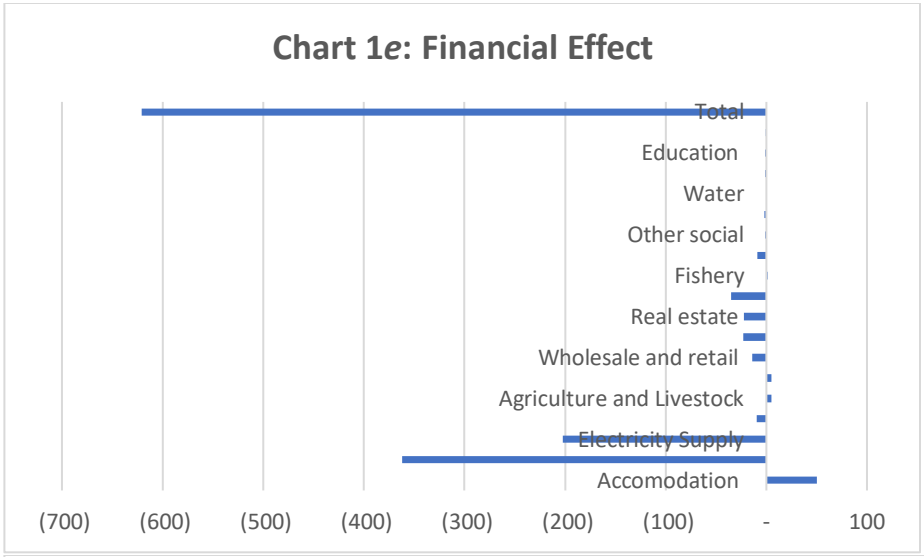


Chart 1e: Financial Effect
Total
Education
Water
Other social
Fishery
Real estate
Wholesale and retail
Agriculture and Livestock
Electricity Supply
Accomodation
(700)
(600)
(500)
(400)
(300)
(200)
(100)
-
100

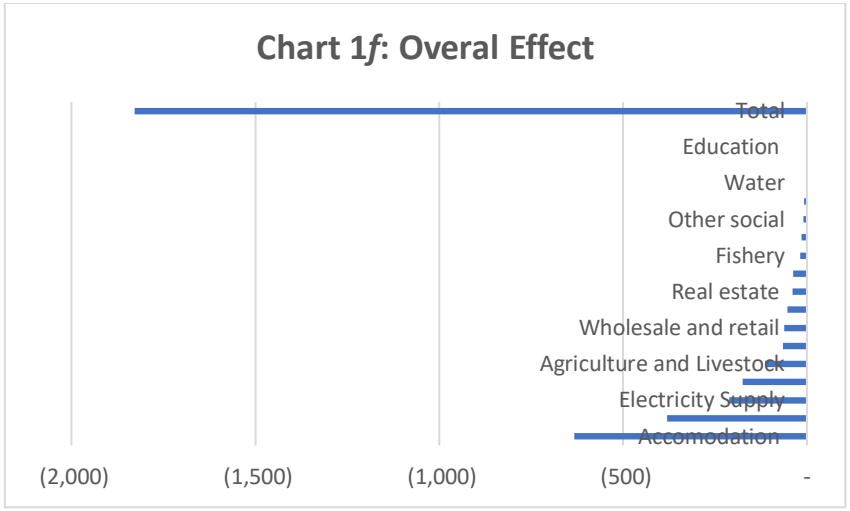
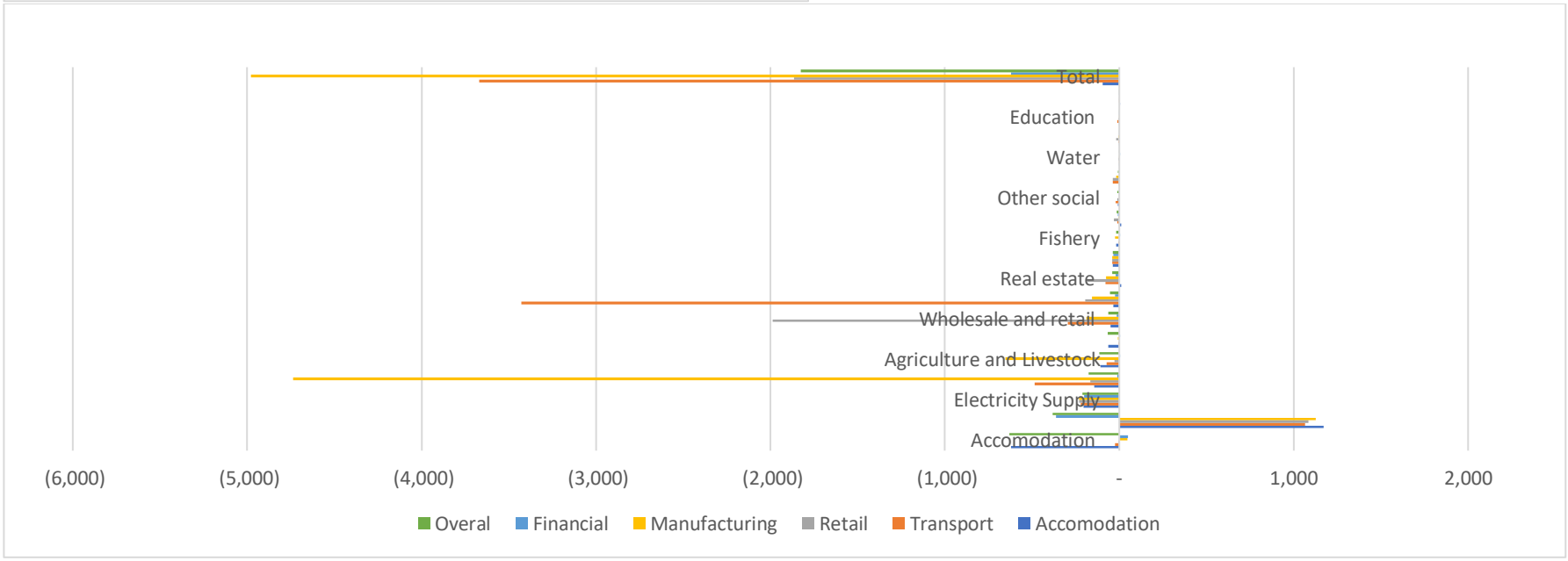
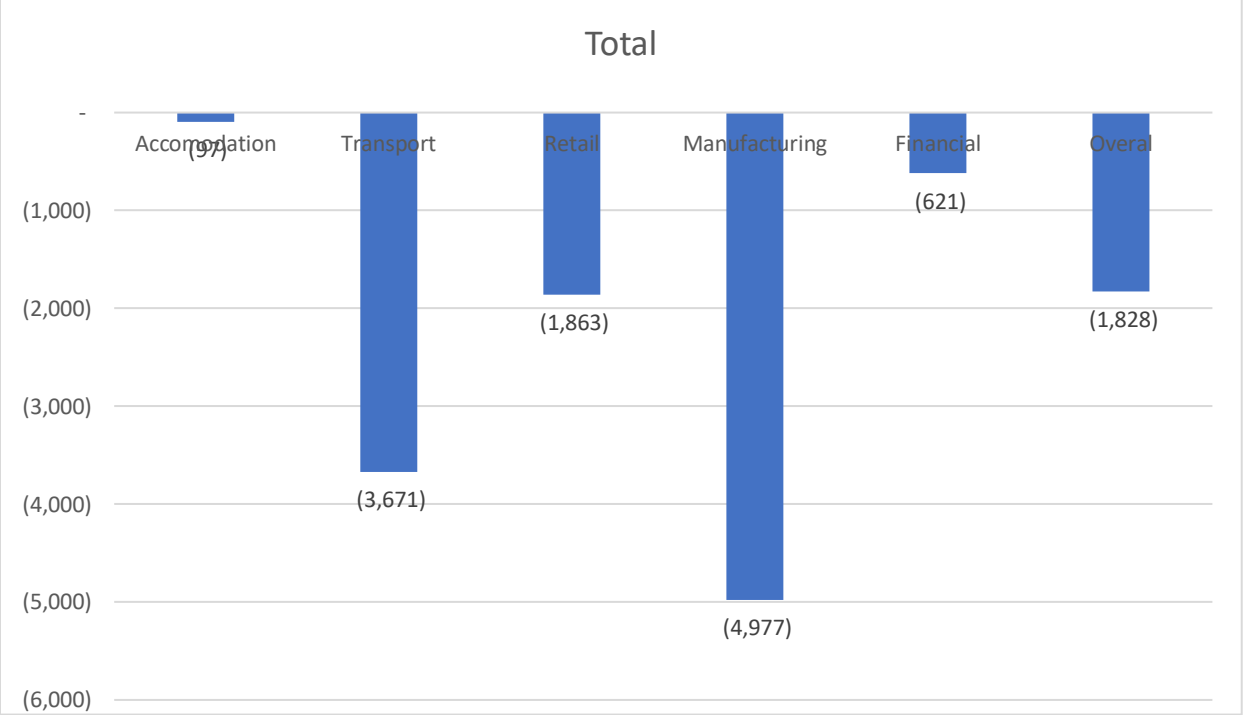


Chart 1f: Overal Effect
Total
Education
Water
Other social
Fishery
Real estate
Wholesale and retail
Agriculture and Livestock
Electricity Supply
Accomodation
(2,000)
(1,500)
(1,000)
(500)
-


Total
Education
Water
Other social
Fishery
Real estate
Wholesale and retail
Agriculture and Livestock
Electricity Supply
Accomodation
(6,000)
(5,000)
(4,000)
(3,000)
(2,000)
(1,000)
-
1,000
2,000
Overal
Financial
Manufacturing
Retail
Transport
Accomodation

To our surprise, shocks in financial sector had a positive effects in some sectors such as accommodation and those related to agricultural sector. Dell'Ariccia et al. (2008), Kroszner et al. (2007) and Bonfiglioli and Mendicino (2005) find that industries with a high degree of financial dependence are hit most severely by financial shocks when compared to the less dependent firms. Looking at the statistics on domestic lending by borrowing activity agriculture related and hotels are less dependent on borrowing and since 2015 to 2019 the sectors attract an average of three percent of lending only, making the sectors being resilient to financial shocks and hence continuing to grow following their growth trajectories.

Chart 2: Estimated GDP Loss/Gain, Partial and Aggregate Sectoral Effects (Bill TZS)



Considering partial effects (see Chart 2), in which effects to total GDP emanating from shocks in other sectors other than the one in consideration are held constant, indicates that shocks in manufacturing sector has more individual impacts than the rest of the sectors under consideration, followed by Transport sector, retail and then financial sector. These results are not surprising given the nature of the multiplier effects of these sectors. Manufacturing and transport interrelate by many sectors both within forward or backward linkages when compared to other sectors. In this work, as observed in Magoti and Mtui (2020) in the short run the growth in services sector has no effect on the economic growth.

Notably, our analysis only measure the effects that might emanate via specific impact channels, specifically from the shocks that face manufacturing, retail, transport, financial and accommodation sectors. However, domestically, restrictions on movement of people and goods within Tanzania and on certain productive activities are likely to have significant adverse impacts on the economy as well. It is also understood that not all sectors will end up being negatively affected by shocks, some sectors such as ICT, financial, the health-related goods and some services sectors may benefit from the shocks. Also some counter measures by the government may

reduce in actual sense the anticipated negative effects.

5. Conclusions

The COVID-19 pandemic and the associated economic crises are posing huge challenges in most of the world economies. Recently, the government of Tanzania made decisions to relax some measures, however, some sectors had already been hardly hit by the pandemic by the time the government relaxed some of the measures. This study makes use of the Tanzania's Input-Output Tables (2015) to conduct a sectoral analysis of the interrelations and flows that occur among sectors of the economy. The study simulates the effects of shocks in accommodation, retail trade, financial, manufacturing and transport sectors in the overall GDP to find out that when considering aggregate effects in which sectoral effects balance themselves, the pandemic effects on overall growth do not differ much with government estimates. When assessing the partial effects, in which effects to total GDP emanating from shocks in other sectors other than the one in consideration are held constant, shocks in manufacturing sector has more individual impacts than the rest of the sectors under consideration, followed by transport sector, retail and then financial sector. These results imply that since manufacturing and transport sectors have higher multiplier effects and more forward or backward linkages, then any government fiscal stimulus packages should deliberately focus on these sectors. Also, in view of these imminent challenges facing global economy and Tanzanian economy in particular, the government must dramatically overhaul policies and invest in economic stimulus, and social safety nets, to help recover faster from the COVID-19 pandemic effects.

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