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MODELLING A GENDER INCLUSIVE COVID-19 RECOVERY FOR ZIMBABWE (#6661),

Margaret Chitiga, (Corresponding author) School of Public Management and Administration, University of Pretoria, South Africa. Email: margaret.chitiga@up.ac.za

Martin Henseler, Thünen Institute of Rural Studies, Braunschweig, Germany; Partnership for Economic Policy (PEP), Nairobi, Kenya; EDEHN – Equipe d'Economie Le Havre Normandie, Université du Havre, Le Havre, France

Ramos Mabugu, Email: emmanuel.mabugu@spu.ac.za, Sol Plaatje University, 26 Scanlan Street, Kimberley, South Africa, 8301, South Africa

Helene Maisonnave, EDEHN – Equipe d'Economie Le Havre Normandie, Université du Havre, Le Havre, France

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Abstract

On March 20, 2020, Zimbabwe reported its first confirmed coronavirus disease (COVID-19) case. The pandemic, coupled with extraordinary responses to combat it, is expected to have an impact on the people and the economy. Woman-headed households are facing the biggest impact through income loss, food insecurity and care-giving burdens. Research presents preliminary modelling analysis of the impact of alternative COVID-19 mitigation and recovery scenarios. The study relies heavily on the use of a tailored Zimbabwean computable general-equilibrium model linked to a household survey based micro-simulation model. A 2019 Social Accounting Matrix and a 2017 household income survey are used to implement the models. The analysis is done nationwide and across diverse socioeconomic categories - in particular, gender and rural/urban regions, with a view to identifying the most affected and vulnerable populations and how the planned recovery policies affect them.

Six scenarios simulate the impacts and recovery and response policies. As impact and recovery scenarios, we differentiate a scenario with an early recovery --resulting in relative "mild" expression of the impacts—and a scenario with a later recovery --resulting in relative "severe" expression of the economic impacts.

The modelling analysis so far presents the following important conclusions:

- The mild scenario is harsh, but compared to the severe scenario, it's impact is lower.
- The mitigation measures are helping, and they are helping women even more. The side effect of the mitigation measures is the negative impact on investment in the long run.
- The recovery scenarios help to get the sectors back to production, which is welcome as it leads to an increase in investment. However, although the BAU values are still not reached, the economy gets closer to reaching where it would have been had there been no COVID-19 pandemic.

1. Introduction

Zimbabwe, with total land area of 390,580 km^2, is a landlocked Southern African country which borders Zambia, Mozambique, Botswana and South Africa. The country got independence on 18th April 1980 from Britain. Zimbabwe is currently classified as a low middle-income country. The country's gross domestic product (GDP) is composed of agriculture (18%), industry (24%) and services (58%) sectors. There are 16 official languages, with English, Shona and Ndebele the most commonly spoken.

On March 20, 2020, Zimbabwe reported its first confirmed coronavirus disease (COVID-19) case. Government declared the pandemic a State of National Disaster and acted early to suppress the transmission of the virus by placing a nationwide lockdown regime with severe restrictions on travel and movement of people. The lockdown measures also required closure of certain businesses and public places, bolstering of hygiene control and general behavioural controls. However, almost a year later, the corona virus continues to spread and the country entered into its second nationwide lockdown in January 2021. Beyond the devastating health impacts, the COVID-19 pandemic is having deep and sustained negative economic and social impacts. The impacts are expected to be particularly hard on the vulnerable socio-economic groups, in particular women, whose role in the economy extends beyond the market economy into important non-market economy activities such as child caring, caring for the sick and elderly. The pandemic's impact on output, households and public finances in 2020, 2021 and beyond is projected to be significant. As a result, Government has put in place several measures to mitigate the short-term impact of the pandemic and a stimulus package to support recovery of the economy. Anticipating the impacts of such policies would be an advantage to policy makers particularly when weighing the costs and the benefits for the population, especially on women. To this effect, this Updated Research Report presents preliminary modelling analysis of the impact of alternative COVID-19 mitigation and recovery scenarios using tailored Zimbabwe simulation models. The analysis is done nationwide and across diverse socioeconomic categories - in particular gender and rural/urban regions, with a view to identifying the most affected and vulnerable populations and how the planned recovery policies affect them.

A two-layer economic model has been used to carry out the analysis, consisting of a micro- and macro- economic model that communicate through a set of interrelated variables. The macro-model is a Computable General Equilibrium (CGE) model that addresses issues related to economic growth, investments, and external trade among others. The base CGE model used is the PEP 1-t model developed by Decaluwé et al. (2013) that we then modify to fit in with Zimbabwean characteristics. The model has detailed representation of institutions, industries,

gendered labour markets and products and is well suited for assessing the impact of COVID-19 and of government intervention policies to mitigate the negative effects of the pandemic.

CGE models on their own cannot fully analyse the distributional impacts. Hence, we execute a micro-simulation model framework to analyse the distributional impacts of the COVID-19 pandemic and policy simulations on poverty and inequality at the individual household level. We compute the Foster–Greer–Thorbecke (FGT) indices oriented to the Zimbabwean economy based on the household consumption data. The poverty lines are defined as benchmarks to measure the minimum total consumption (to measure poverty) and the minimum food consumption (to measure extreme poverty). We measure the impact on poverty and extreme poverty at national level[1]. A more elaborate description of the Zimbabwe two-layer economic model and data is presented later in the study.

The modelling includes seven scenarios out of which one is the Business As Usual (BAU) as the reference scenario. The other scenarios will be compared to the BAU. Six scenarios simulate the impacts and recovery and response policies. The BAU scenario simulates the Zimbabwean economy without the COVID-19 pandemic until 2030. As COVID-19 impact scenarios, we assume impacts differentiated for economic sectors in a first period and an economic recovery from the shock in a second period. Up to date it is not known how long the COVID-19 pandemic will impact the Zimbabwean economy. Therefore, we simulate two scenarios with different duration of the impact of the pandemic and different start periods of recovery: a **mild scenario** and a **severe scenario**. In the mild scenario the impacts of the pandemic last from 2020 until 2022 and the economy recovers from 2023. In the severe scenario the impacts of the pandemic last one year longer (from 2020 until 2023) and the recovery starts one year later, from 2024 onwards. As mitigation measures we simulate a fiscal package being implemented in 2020 and 2021. To analyse the effectiveness of this recovery policy under different impact-recovery scenarios, we apply this measure to the mild and to the severe scenarios. As gender policy, we simulate an extra fiscal assistance for the sector “other services”, which is the most female intensive sector. The gender policy is applied in addition to the two mitigation scenarios for the mild and the severe impact.

The rest of the study is divided into eight sections to help better understand the implications of the pandemic and recovery options on the overall economy, sectors and households. Section 2 presents an overview of the economic context with a particular focus on the period preceding and at the onset of COVID-19. Section 3 presents an overview of the key gender issues in Zimbabwe relevant for the subsequent modelling undertaken on the relationship between economic recovery and gender objectives. Section 4 presents a relevant literature review. Section 5 presents a

[1] A differentiation of households by gender and into rural/urban, will be subject for the next report.

description of the data, followed by a description of the models used in Section 6. Section 7 presents the findings, including the poverty effects, the changes in inequality, the impact on the overall economy, sectors and institutions, of the policy measures intended to improve the welfare and living conditions of the population of Zimbabwe. Finally, a set of conclusions and emerging recommendations for recovery and rebuilding the economy are presented in section 8.

2. Economic Context and COVID-19 Pandemic

This section gives a brief country background and overview to the economic conditions. This is followed by discussion of the COVID-19 pandemic in Zimbabwe. The section ends by outlining the policy response by government to the pandemic, divided into short and long term responses.

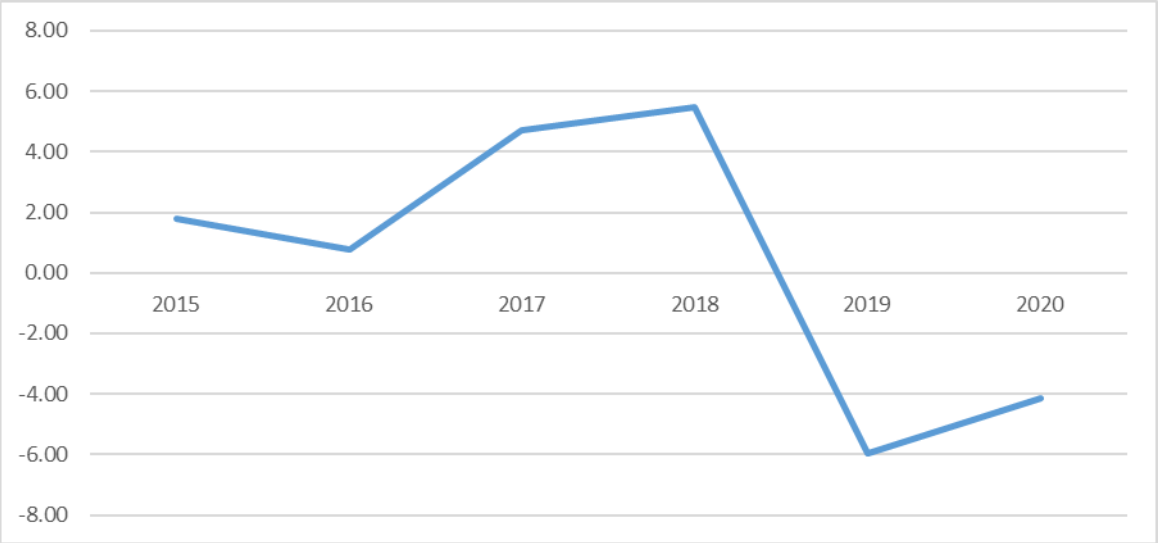
2.1 Economic context, background and COVID-19 pandemic

Upon confirmation of its first COVID-19 positive case on 20th March 2020, a raft of strict pandemic containment measures including a nationwide lockdown were implemented under the auspices of an Ad-Hoc Inter-Ministerial Committee on COVID-19 from April 2020. Despite these pandemic containment measures, the number of confirmed COVID-19 cases had risen steadily, reaching 8,187 confirmed cases, with 7,692 recoveries, 262 active cases and 233 deaths as of 20 October 2020. In January 2021 Zimbabwe implemented a second nationwide lockdown as positive cases continued to rise exacerbated by a second wave of the pandemic. As at February 24th 2021, the number of confirmed COVID-19 cases had risen to 35,960 confirmed cases, with 32,410 recoveries, 2,094 active cases and 1,456 deaths. Zimbabwe entered into a second Level Four national lockdown on January 5, 2021 that was subsequently extended by two weeks to end on February 15, 2021 due to a sharp increase in the number of infections and fatalities of the second wave of COVID-19. The lockdown was further extended by two more weeks from February 15th to 1st of March 2021. The responses to the pandemic will likely continue to push the country deeper into recession.

The pandemic struck when the Zimbabwean economy was already in a decline, weighed down by climatic shocks (Cyclone Idai in March 2019 and cyclone Kenneth in April 2019), severe drought and unstable macroeconomic environment (Government, 2021 National Budget Statement). The economy recorded an average growth of 3% between 2013 and 2018. Since 2018, economic conditions have been worsening, leading to estimated declines of 6% and 4.1% respectively in 2019 and 2020 as shown in Figure 1 (ZIMSTAT, 2019a). This has been compounded by mismanagement of public funds and resources. According to recent rankings announced by Transparency International, the country remains among the most highly corrupt countries in the world, ranked at 157 out of 180 countries in the 2020[2]. The outlook is gloomy as the economy is now battling a second wave of the pandemic while domestic vulnerabilities are likely to persist in 2021.

[2] Transparency International Index. Zimbabwe's score is at 24 out of 100 and this score is way below the Sub-Saharan Africa average of 32. The most recent survey focused on the management of funds donated towards COVID-19.

Figure 1. Recent GDP growth in Zimbabwe before the pandemic (%)*



Source: ZIMSTAT (2019a), Government of Zimbabwe (2020b)

**2018-2020 figures are estimates*

As shown in Table 1, output in sectors such as agriculture and forestry, mining and quarrying, manufacturing, electricity and water, construction, distribution, hotels and restaurants and financial, banking and insurance activities were expected to fall by more than 8% in 2019, a year prior to onset of the COVID-19 pandemic. With the exception of transportation and communication, the rest of the sectors are expected to continue falling in 2020, albeit the fall is by a lower magnitude than experienced in 2019.

Table 1: GDP growth by sector (%)*

	2015	2016	2017	2018	2019	2020
Overall GDP growth	**1.8**	**0.8**	**4.7**	**5.5**	**-6.0**	**-4.1**
Agriculture and forestry	-5.2	-3.9	10.0	18.3	-17.8	-0.2
Mining and quarrying	0.4	4.1	3.5	8.7	-12.4	-4.7
Manufacturing	0.2	0.6	1.3	1.3	-8.7	-9.6
Electricity and water	-4.6	-1.7	4.0	22.5	-19.2	-7.9
Construction	4.0	1.5	3.9	2.0	-13.9	-11.4
Distribution, Hotels and restaurants	3.8	6.8	7.6	4.5	-8.2	-6.8
Transportation and communication	4.9	1.1	5.1	2.6	12.9	3.4
Financial, banking and insurance activities	5.5	4.7	3.1	6.5	-6.1	-6.5
Government services	-0.8	-1.1	3.9	-4.2	1.4	-2.1
Other service activities	0.2	6.4	1.5	2.0	-3.7	-2.0

Source: ZIMSTAT (2019a), Government of Zimbabwe (2020b)

**2018-2020 figures are estimates*

On the expenditure side, all components of GDP, except investment, fell in 2020. Private consumption, a major driver of aggregate demand, declined from 85.2% in 2015 to 79.4% of GDP in 2020. Similarly, investment has been declining from about 10% of GDP in 2018 to the around 8.6% in 2020 of GDP predominantly on account of declining investments by government as shown in Table 2. The current account surplus widened to about 6.4% of GDP as global market disruptions and domestic challenges as a result, the pandemic depressed imports more than exports in 2020.

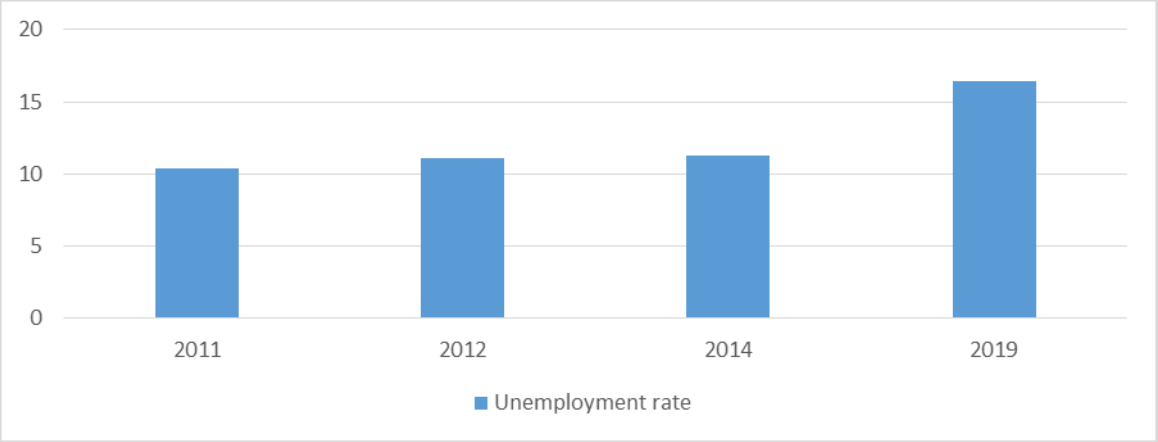
Table 2: GDP by Expenditure (as % of GDP)*

	2015	2016	2017	2018	2019	2020
Private Consumption	85.2	79.3	75.3	88.2	80.3	79.4
Public Consumption	18.9	18.1	22.4	11.1	8.2	7.8
Investment	10.0	9.9	8.7	10.1	8.6	8.6
Exports of goods and services	19.8	19.6	21.8	28.0	36.2	26.5
Imports of goods and services	36.1	30.1	29.2	41.4	37.1	26.2

Source: ZIMSTAT (2019a), Government of Zimbabwe (2020b)
**2018-2020 figures*

According to ZIMSTAT Labour Force survey of 2019, broad unemployment rate[3] increased from 10.4% in 2011 to 16.4% in 2019 (Figure 2). This is an increase of 6 percentage points over a period of 8 years.

Figure 2. Recent unemployment rate in Zimbabwe before the pandemic (%)



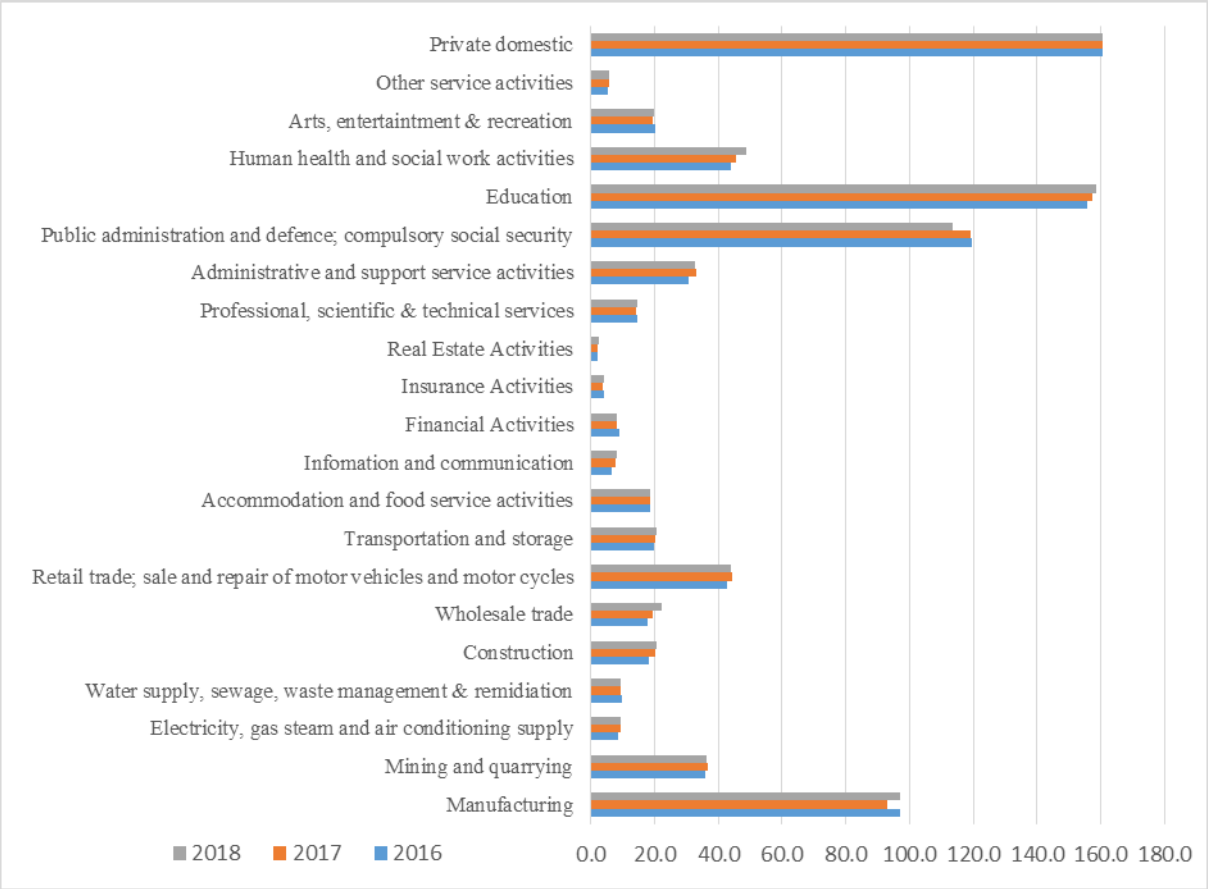
Source: ZIMSTAT (2019a)

The sectoral distribution of labour shows the total number of employees, excluding agriculture, increasing by 0.9% in 2017 from 840 400 to 848 300 employees and further increased to 854 800

[3] Unemployed persons by broad definition are persons aged 15 years and above who, during the reference period were without work and available for work,

employees in 2018, (ZIMSTAT, 2019a). On a sectoral basis, information and communication employees increased by 23.7% in 2017, showing the importance of innovation and technology in the economy. Financial activities employees decreased by 5.4% in 2017, as shown in Figure 3, due to scaling down of operations by most commercial banks which closed or merged most branches countrywide,.

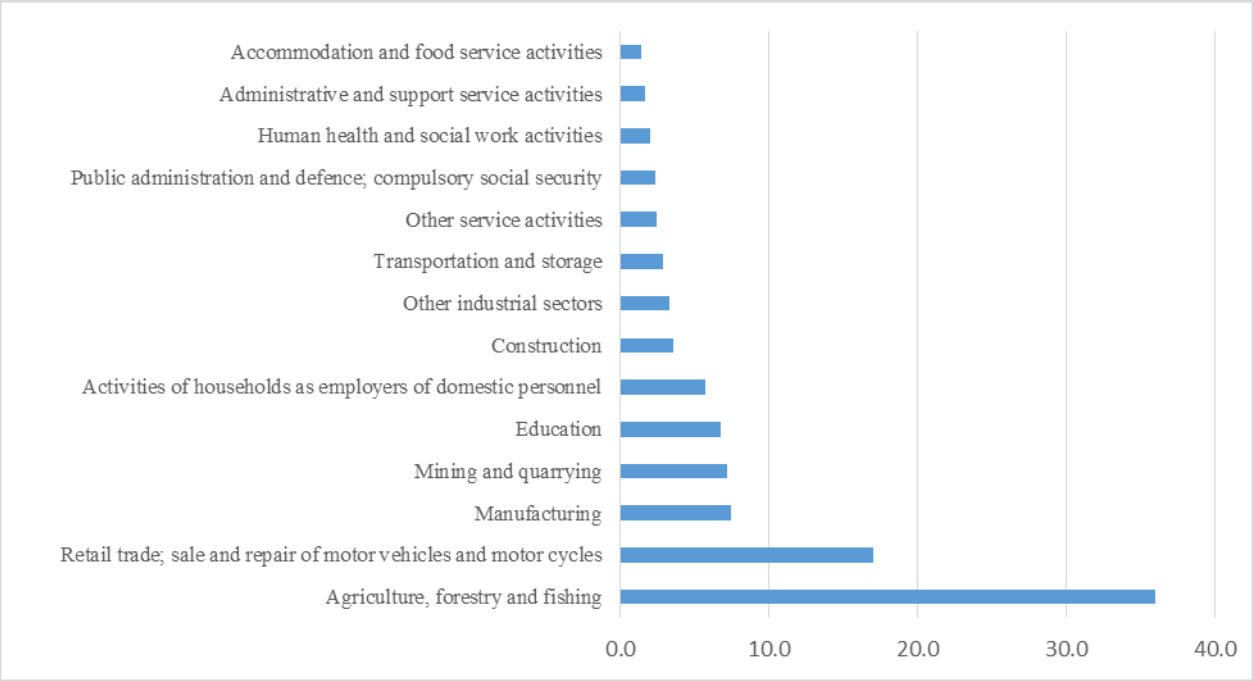
Figure 3. Annual average number of employees by industrial sector (2016, 2017 and 2018)



Source: ZIMSTAT (2019a)

According to the Labour Force Survey of 2019, the distribution of employees across industries, following years of deindustrialisation shows that labour has moved to agriculture and retail mostly as self-employment with low productivity, as shown in Figure 4.

Figure 4: Distribution of employees by industry

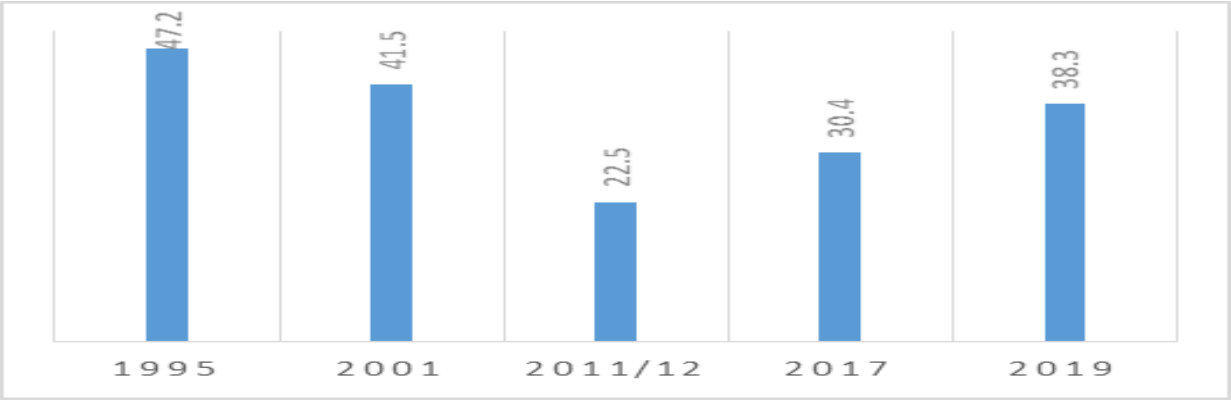


Source: ZIMSTAT (2019a)

The picture painted is that most of the employed population were engaged in the agriculture, forestry and fishing industry followed by retail trade, sale and repair of motor vehicles and motor cycles (ZIMSTAT, 2019a). This implies that the pandemic struck a labour market characterised by a high share of informalisation, engaged in primary industries and predominated by self-employed workers. Low-skilled workers in low-skill occupations as well as women tend to be mostly employed in these areas and are therefore the ones who are more susceptible to the pandemic.

Finally, in terms of developmental challenges, Zimbabwe had managed to reduce extreme poverty from 47.2% in 1995 to 22.5% in 2011/2012 according to the Poverty Income Consumption Expenditure Survey (PICES) report. However, a combination of natural disasters, droughts, cyclone Idai, corruption and general macroeconomic challenges resulted in increased extreme poverty, with the Zimbabwe Poverty Update 2017-2019 suggesting that extreme poverty increased sharply in 2019 and is projected to worsen further in 2020. As shown in Figure 5, extreme poverty is estimated at 38.3% in 2019. Income inequality also witnessed the same trend with poverty since 2012. Income inequality as measured by the Gini coefficient increased from 42% in 2011/12 to 44.7% in 2017 and 50.4% in 2019.

Figure 5: Extreme Poverty (% of population)



Source: ZIMSTAT and World Bank (2020)

2.2 Short term policy responses

Government launched a COVID-19 National Preparedness and Response Plan on 19th March 2020. As part of the plan, Government launched a US$2.2 billion domestic and international humanitarian appeal on 2nd April, 2020. A total of US$448.4 million humanitarian support had been disbursed as at September 2020 partners (IMF COVID-19 Policy Tracker, 2021). The WFP also made an appeal in late December, for US$204 million to support 3.5 million food insecure households and 0.5 million vulnerable urban residents, complementing the response of Zimbabwe's government and other partners (IMF COVID-19 Policy Tracker, 2021)[4].

Government unveiled a ZWL$18.2 billion (US$996.71 million) stimulus package in order to mitigate the economic consequences of the pandemic (Government of Zimbabwe, 2020).[5] The stimulus package is intended to scale up production in all sectors, support small-scale industries, improve health facilities and cushion vulnerable groups from negative effects of the pandemic. Table 3 summarises details of the 2020 stimulus package. For 2021, the government set up a recovery plan of 5 billion United States dollars (USD).

[4] www.imf.org/en/Topics/imf-and-covid19/Policy-Responses-to-COVID-19#Z

[5] Additionally, Government has also put in place other Fiscal Policy Relief Measures, which include Import Duty on Raw Materials, Corporate Tax Credits for COVID-19 Donation, and Tax Relief Measures. (2020 Mid-Year Budget Review).

Table 3. Stimulus package 2020

Area	Amount (ZWL$ million)	Amount (US$ million)
Agriculture Sector Support	6,100	334.06
Working Capital Fund for Industry	3,000	164.29
Mining Sector Facility	1,000	54.76
SME (Small and Medium-sized Entreprises) Support Fund	500	27.38
Tourism Support Fund	500	27.38
Liquidity from Statutory Reserves	2,000	109.53
Health Sector Support Fund	1,000	54.76
Broad Relief Measures	1,500	82.15
COVID Cash Transfer	2,400	131.43
Arts and Sport Grant	200	10.95
TOTAL	**18,200**	**996.71**

Source: Government of Zimbabwe (2020b) and authors' conversion to US$ as at February 2021

While the combination of weakening revenues and higher public spending needs to protect lives and livelihoods are expected to increase the budget deficit, the fiscal deficit is actually expected to be contained as 1.2% of GDP in 2021. The combination of continued fiscal consolidation resulted in the wage bill being contained as wage adjustments were kept limited in the first half of 2020 while the scaled up social assistance to urban beneficiaries was delayed due to implementation challenges and basic services remained underfunded. With growing public debt, Zimbabwe will continue to face constrained fiscal space to mitigate the impact of the pandemic and support the post-COVID recovery. This will be further exacerbated by the observation that the country still has limited or no recourse to concessional external financing because of debt arrears.

On the monetary front, the Central Bank reduced the statutory reserve ratio on bank deposits from 5 to 2.5 percent by June 2020, while the policy rate was initially lowered from 35 percent to 15 percent per annum but has since July 1, 2020 reverted back to 35 percent to stem speculative borrowing (IMF COVID-19 Policy Tracker, 2021).

2.3 Medium to long term policy responses

As part of the National Development Strategy 1: 2021-2025 (NDS1) launched in November 2020, Government intends to strengthen the economy's resilience to shocks including climatic

and health related shocks such as COVID-19 and other future health pandemics (Government of Zimbabwe, 2020a). Precisely, the 5-year plan intends to enable the country to recover from the devastating effects of the COVID-19 pandemic, realise Vision 2030 while simultaneously addressing the global aspirations of the Sustainable Development Goals (SDGs) and regional aspirations of Africa Agenda 2063. As a medium term measure to address the effects of COVID-19, Government has launched a COVID-19 vaccination program to vaccinate 10 million people which is about 60 percent of the population (Government of Zimbabwe, 2021). In the long term, Government will implement measures to support the development of a robust all-inclusive health system which can withstand and quickly react to future COVID-19 and future health pandemic. The health measures will include: the development and implementation of a health sector coordination framework to harmonise the fragmented health system; implementation of a strong health insurance schemes; supporting human capital development; local drug manufacturing and strengthen procurement and regulation of medicines and commodities. Above all the NDS 1 aims to improve domestic funding of health which is critical to support flexibility in dealing with future emerging health crisis.

3. Zimbabwe Gender Background

In this section, the gender focused socio-economic profile of the country is presented. This is followed by a discussion of main gender strategies and targets. The intention of the section is to inform priorities when modelling gender objectives and economic recovery links.

3.1 Socio-economic issues and gender

Zimbabwe had an estimated population of 13.5 million in 2017. As shown in Table 4, Zimbabwean women made up 52% of the population.

Table 4: Population Size

Sex	Number	Percent
Female	7 057 731	52
Male	6 514 829	48

Source: ZIMSTAT (2019a)

Table 5 shows that the majority of the Zimbabwean population resides in rural areas. Out of the 68% of the population that is rural, 52% of these are women.

Table 5: Distribution of Population by Rural/Urban and Sex

		Sex	
Location	Total (%)	Female (%)	Male (%)
Rural	68	52	48
Urban	32	53	47

Source: ZIMSTAT (2019a)

Understanding men and women circumstances is important as it gives a good idea of their livelihoods. There are several reasons why this is the case, including the tendency of women to occupy low paying jobs, to receive less pay for similar jobs compared to males, and the usual lack of ownership rights. In this regard, household headship is important for household welfare status. As many studies have found, female-headed households tend to fare worse than male-headed households do. Thus, it is important to understand the status of headship as a difference in headship can potentially affect households differently after a shock such as COVID-19. Table 6 shows that, out of the 3.5 million households in Zimbabwe, women head 39% of these, with the remaining 61% being male-headed (2019 LFCLS).

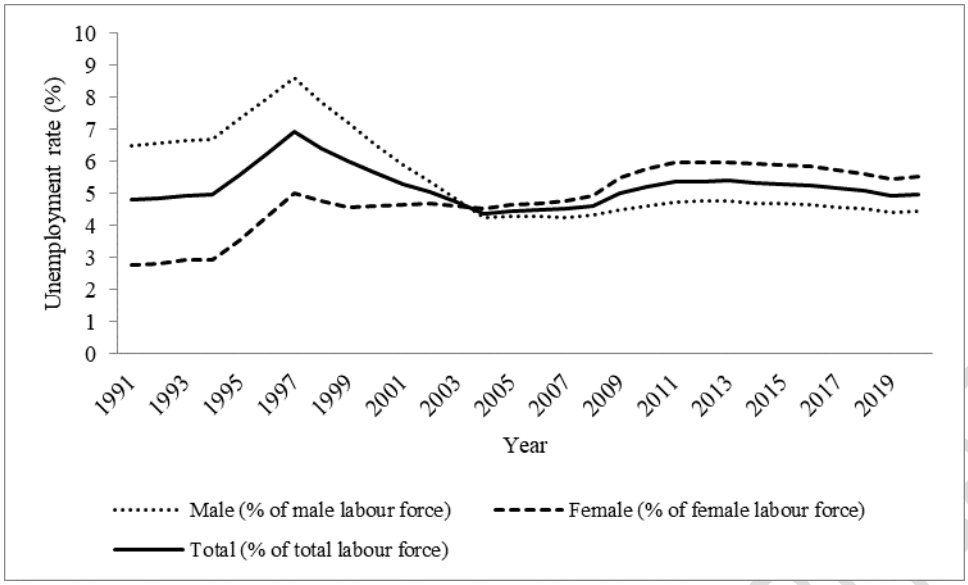
Table 6: Composition of Households by Size and Sex of Head of Household

Household size	Male-headed		Female-headed		Total percent	Total households	
	Percent	Number	Percent	Number		Number	Percent
1	60.9	256 239	39.1	164 646	100	420 885	12.2
2	47.8	197 766	52.2	215 821	100	413 587	12.0
3	54.7	331 250	45.3	273 798	100	605 049	17.5
4	60.4	393 381	39.6	257 932	100	651 313	18.8
5	67.0	367 983	33.0	181 006	100	548 988	15.9
6	69.4	262 941	30.6	115 814	100	378 755	11.0
7	69.4	151 728	30.6	66 902	100	218 630	6.3
8	72.1	82 774	27.9	31 953	100	114 727	3.3
9+	69.0	71 785	31.0	32 209	100	103 994	3.0
Total	61.2	2 115 847	38.8	1 340 080	100	3 455 928	100

Source: ZIMSTAT, (2019a)

One determinant of welfare is employment. Unemployment is relatively low in Zimbabwe, at 16.4% in 2019 according to the 2019 LFCLS data. It should be borne in mind that many jobs are informal, being rather low paid, temporary, unreliable and without social safety nets like pension and medical aid. As shown in Figure 6, since 2003, female unemployment has been higher than male unemployment and average unemployment.

Figure 6: Unemployment rate by sex in Zimbabwe, 1991 – 2020.



Source: Authors' construction using data from ILOSTAT (2020a, b, c)

Education attainment is a determinant of skills and labour market access. In Zimbabwe, the 2019 Labour Force and Child Labour Survey (LFCLS) showed that the levels of literacy for women (98%) were only slightly higher than that for men (97%). In terms of school attendance for the population aged 3 to 24, the 2017 ICDS data showed that about 65% of males and 61% of females were attending school. Completion of education is an important end result of enrolment because it ultimately determines the labour market outcomes of the majority of the population. The 2019 LFCLS data showed that women dominated the lower education categories including having no education, up to lower secondary education. Men, on the other hand, dominated the education categories above lower secondary up to doctorate degree education attainment. Data from the Ministry of Higher and Tertiary Education, Innovation, Science and Technology Development (MoHTIESTD) shows that between 2017 and 2019, there were more women enrolled in universities compared with men, although more men were taking science degrees while more women were in humanities and arts degrees. This information gives an indication that women would also dominate lower-paid occupations compared with their male counterparts.

Given that agriculture is the mainstay of most households in Zimbabwe, and given that most women (57%) reside in rural areas, it is important to understand the status of women in this sector. The 2019 LFCLS shows that, out of 45% of the population who have ownership or user rights in agriculture, women constitute 44.9% compared with 45.9% for men. Concerning ownership of other farm assets such as vehicle and livestock, men clearly dominate women in terms of possession, (2019 LFCLS).

Because of the disparities in the educational attainment and the types of education fields, it is not surprising that women and men show different employment characteristics. In particular, there are disparities in terms of occupations of men and women. The data from the 2019 LFCLS revealed that 57.4% of women compared with 64.8% of men were in paid employment. The proportions of labour force participation by age group and sex are shown in Table 7. Men have a higher representation in the labour force across all age groups.

Table 7: Labour Force Participation Rate by Age Group and Sex

Age group	Female (%)	Male (%)
15-19	14.8	22.2
20-24	35.6	57.9
25-29	45.2	70.4
30-34	49.1	74.7
35-39	51.5	69.3
40-44	47.4	68.2
45-49	46	69.2
50-54	42.8	71.6
55-59	31.5	54.9
60-64	22.2	43.2
65+	9.1	19.3

Source: ZIMSTAT (2019a)

Concerning the specific occupation categories, Table 8 shows that men and women occupy different activities in the economy. For instance, there were more women in 'own account' employment (38.8%) compared with men (32.3%). More men tend to be employers (5.2%) compared with women (3.2%). Finally, more women are contributing family workers than men, 0.6% compared with 0.3%.

Table 8: Distribution of Economically Active Population by Current Activity in the Economy

Status in Employment	Women (%)	Men (%)
Employer	3.2	5.6
Own Account Worker	38.8	32.3
Employees	57.4	64.8
Contributing Family Worker	0.6	0.3

Source: ZIMSTAT (2019a)

The occupations and sector of employment matters for the wages that workers receive. In terms of occupation, women tend to be dominant in service-related and sales occupations, clerical and professional related occupations, while men tend to dominate occupations of armed forces, plant and machine operators as well as crafts and related trades as seen in Tables 9. Specifically, the evidence in Table 9 points to women being employed predominantly in occupations and sectors that are generally less consistent and predictable in terms of wages paid. Such sectors tend to be some of the first hit in the face of a disaster such as the COVID-19 pandemic. Indeed, this is confirmed by income data from the 2019 LFCLS which showed that women earned consistently less than men from paid employment in the period just prior to the survey (see Table 10).

Table 9: Share of Women in the Ten Selected Occupational Categories

Occupational Category	Women (%)	Men (%)
Armed forces occupations	7.4	92.6
Managers	33.7	66.3
Professionals	58.4	41.6
Technicians and associate professionals	34.7	65.7
Clerical support workers	57.3	42.7
Service and sales workers	59	41
Skilled agricultural, forestry and fishery workers	49.3	50.7
Craft and related trades workers	23	77
Plant and machine operators, and assemblers	11.9	88.1
Elementary occupations	42.9	57.1

Source: ZIMSTAT (2019a)

Table 10: Percent Distribution of Income Received among Women and Men who were in Paid Employment

Income Received	Women (%)	Men (%)
Zero	16.8	10.2
$1 - $200	52.7	47
$201 - $300	5.6	9.5
$301 - $400	4.3	6.2
$401 - $500	3.5	5.7
$501 - $600	2.4	4.1
$601 - $700	3.8	3.1
$701 - $800	4.3	2.9
$801 - $900	0.9	0.8
$901 - $1 000	1	1.7
$1 001 - $3 000	3.5	5.7
$3 000 and above	1.1	3.1

Source: ZIMSTAT (2019a)

As seen in Table 10, women were concentrated at lower income levels compared with men. In general, the proportion of men increases as the income-received band increases. This is consistent with the fact that women spend less time in paid employment than men. Table 11 also shows that women work less hours in paid occupations compared with men. For example, 53% of women work less than 20 hours per week compared with 47% of men. This is likely one of the main reasons that women receive less income from employment than men.

Table 11: Currently Employed Persons by Actual Hours Worked in all Jobs

Hours Worked per Week	Women (%)	Men (%)
Under 20	52.8	47.2
20-29	49.9	50.1
30-39	44.0	56.0
40-48	42.0	58.0
49+	32.8	67.2

Source: ZIMSTAT (2019a)

Another important factor is that 42% of the workforce in the agricultural sector are women while women make up 43% of the non-agricultural paid work (Table 12). Within the large-scale agricultural sector, women earned 83% of what the males earned and by 2017 this had fallen to 78% according to the 2017 ALS data. This pay gap is reflected in all the different agricultural sector types with the small-scale sector showing the biggest decline between 2015 (94.2%) and 2017 (73%) (See Table 13).

Table 12: Percent Distribution of Employed Persons in the Agriculture Sector Aged 15 Years and Above by Status in Employment and Sex, 2019 LFS

Status in Employment	Women (%)	Men (%)	Total
Employers	34.1	65.9	100
Own account workers	49.2	50.8	100
Employees	38.2	61.8	100
Contributing family worker	80.6	19.4	100
Total	41.5	58.5	100

Source: ZIMSTAT (2019a)

Table 13: Gender Pay Gap in the Agricultural Sector, 2015 and 2017

Agricultural Sector	2015 (%)	2017 (%)
Large Scale Commercial Farms	83.1	77.7
Small Scale Communal Farms	94.2	73.4
A1 Farms	78.1	58.3
A2 Farms	90.8	79.9

Source: ZIMSTAT (2019a)

Furthermore, Table 14 shows that women consistently work more hours than men do in unpaid work, such as cooking, childcare, etc. Unpaid caring work in particular can significantly increase during a pandemic and increase the workload of women,

Table 14: Average Time Spend in Unpaid Activities (in hours per week) in Own Household by Women and Men

	Female (%)	Male (%)
Preparing daily meals	12.3	5.4
Preserving food	3.2	2.6
Making goods for household	5.8	5.8
Washing and ironing clothes	4.0	2.1
Cleaning the house or yard	5.7	2.8
Paying bills or fixing property	2.5	1.8
Shopping for household	2.2	3.1
Maintenance and repairing households items	3.1	6.2
Construction or repair work	6.7	6.8
Fetching water	6.6	3.6
Fetching firewood	3.4	2.8
Caring for ill adults	11.3	9.4
Care for children	14.3	6.7

Source: ZIMSTAT (2019a)

Table 15 shows the specific industries in which women and men dominate. Men tend to be employed predominantly in such sectors as transport and storage, Electricity, gas, steam and air conditioning supply, and construction sectors. Women, on the other hand, predominate sectors such as activities of households as employers of domestic personnel, retail trade; sale and repair of motor vehicles and motorcycles, education, and human health and social work activities. Taking out the agricultural sector, Table 16 shows a starker picture of the absence of women in generally high paying, high skill sectors.

Table 15: Percent Distribution of Currently Employed Population Aged 15 Years and Above by Industrial Sector and Sex

Industry	Percent		Total	
	Male	Female	Percent	Number
Agriculture, forestry and fishing	58.5	41.5	100	1 041 507
Mining and quarrying	83.5	16.5	100	208 979
Manufacturing	70.5	29.5	100	217 977
Electricity, gas, steam and air conditioning supply	92.4	7.6	100	7 520
Water supply; sewerage, waste management and remediation	76.4	23.6	100	13 868
Construction	91.0	9.0	100	104 145
Wholesale trade	68.2	31.8	100	9 942
Retail trade; sale and repair of motor vehicles and motor cycles	36.9	63.1	100	491 347
Transportation and storage	91.7	8.3	100	84 885
Accommodation and food service activities	38.5	61.5	100	40 154
Information and communication	73.7	26.3	100	12 680
Financial activities	60.1	39.9	100	11 249
Insurance activities	52.1	47.9	100	6 496
Real estate activities	71.4	28.6	100	1 807
Professional, scientific and technical activities	57.0	43.0	100	20 103
Administrative and support service activities	77.2	22.8	100	50 681
Public administration and defence; compulsory social security	60.6	39.4	100	69 633
Education	39.1	60.9	100	195 721
Human health and social work activities	37.8	62.2	100	57 475
Arts, entertainment and recreation	84.4	15.6	100	10 347
Other service activities	56.8	43.2	100	73 144

Activities of households as employers of domestic personnel	28.1	71.9	100	165 632
Activities of extraterritorial organizations and bodies	63.9	36.1	100	1 772
Total	56.6	43.4	100	2 897 064

Source: ZIMSTAT (2019a)

Table 16: Percent Distribution of Share of Women in Wage (Paid) Employment in the Non-Agriculture Sector by Industry

	Percent		Total	
Industry	Women	Men	Percent	Number
Mining and quarrying	8.6	91.4	100	61 234
Manufacturing	14.8	85.2	100	72 715
Electricity, gas, steam and air conditioning supply	8.6	91.4	100	6 628
Water supply; sewerage, waste management and remediation activities	30.1	69.9	100	8 410
Construction	11.8	88.2	100	48 959
Wholesale trade	28.7	71.3	100	6 324
Retail trade; sale and repair of motor vehicles and motor cycles	44.4	55.6	100	84 975
Transportation and storage	9.9	90.1	100	39 818
Accommodation and food service activities	55.9	44.1	100	28 451
Information and communication	28.2	71.8		8 138
Financial activities	35.7	64.3	100	8 044
Insurance activities	55.2	44.8	100	5 090
Real estate activities	63.4	36.6	100	815
Professional, scientific and technical activities	39.1	60.9	100	14 452
Administrative and support service activities	23.7	76.3	100	44 562
Public administration and defence; compulsory social security	39.6	60.4	100	69 171
Education	61.0	39.0	100	183 805

Human health and social work activities	62.8	37.2	100	53 088
Arts, entertainment and recreation	12.2	87.8	100	6 954
Other service activities	27.1	72.9	100	12 802
Activities of households as employers undifferentiated goods services- and producing activities of households for own use	71.5	28.5	100	152 899
Activities of extraterritorial organizations and bodies	36.1	63.9	100	1 772
Total	43.1	56.9	100	919 106

Source: ZIMSTAT (2019a)

Summing up, the statistical data and information just presented illustrates that in Zimbabwe women are in a more economically precarious position than men. They face higher unemployment rate, have lower income, are employed in very fragile sectors such as agriculture, work more hours and have more responsibilities in unpaid house- and caring work. Aggravating these economic aspects is that women tend to be employed in very fragile sectors such as agriculture. These vulnerabilities for women point to the need for gendered policies.

3.2 Gender strategies, policies and programmes

Zimbabwe's Amended Constitution (of 2013) in Section 17 clearly espouses the importance of gender equality. Furthermore, the country is a signatory to various conventions and agreements that directly speak to gender issues. The SDGs provide key metrics to assess gender equity progress and guide policymaking (see for example SDG5). Other international protocols to which Zimbabwe is a signatory include the Convention on the Elimination of all forms of Discrimination against Women (CEDAW) and the Southern African Development Community (SADC) Protocol on Gender and Development among others. The quest to reduce poverty and to ensure gender equality is central to most of the agreements and conventions.

Domestically, all government ministries have gender focal points which ensures that all government policies mainstream gender dimensions within them (Food and Agriculture Organization (FAO), 2017). National strategies such as the NDS1 speak directly to several SDGs including SDG5 but Zimbabwe still faces significant challenges to meet the SDGs related to gender equality. Finally, the country has in place a Revised National Gender Policy of 2017 covering gender justice, equality, integration, inclusiveness and shared responsibility for sustainable development.

As shown above, despite the country having in place a multitude of strategies, policies and programmes to address gender issues and challenges, the country is still faced with significant

gender inequalities (FAO, 2017). Additionally, women are underrepresented in all other spheres of decision-making, (ZIMSTAT 2019a). There is therefore an imperative for Zimbabwean policymakers to ensure that there is a concerted effort to build back better in terms of gender equality.

4. Literature Review

In this section, an overview of the relevant literature from which lessons for the study are drawn is given. The literature review focuses on a select literature analyzing the economic impacts of past pandemics. At the very broad level, the literature distinguishes the economic consequences of the health impacts from the pandemic itself, and the economic consequences of COVID-19 lockdown policy responses. The former can be classified as the direct effects of COVID-19 while the latter can be thought of as the indirect effects.

Studies estimating *direct costs* of outbreaks would typically include costs of funding the public health response (borne by both the public sector and private sector businesses), loss of productivity due to illness and death of economically active workers. These studies usually use an accounting approach during and sometimes after the disease outbreak. A number of sub themes are explored including issues as budget reallocation effects, incomes forgone, labour supply and labour productivity effects. Examples of such work in this tradition include those of Sachs and Malaney (2002), Brainerd and Siegler (2002) and Haacker (2002).

Another strand of the literature includes studies focusing on the *long term impacts of disease outbreaks*. These studies have typically estimated cross country growth regressions focusing on outbreaks such as the 1918 Spanish Flu epidemic and AIDS. The long run economic impact of epidemics is affected by changes in savings and investments, mortality and fertility, human and health capital destruction and accumulation. Examples of works in this tradition include those of Brainerd and Siegler (2002), Bloom and Mahal (1997ab), Haacker (2002), Bloom and Canning (2006). The findings from this type of literature on economic growth impacts of epidemics are generally inconclusive.

Studies that focus on indirect costs of epidemics typically have a short to medium term horizon. They emphasise interlinkages within economics and globally and trace explicitly the channels of transmission. Outbreaks such as SARS, Ebola and more recently COVID-19 are major focus of these studies. Most of these studies project a cut in GDP growth due to outbreak but the transmission channels used to explain the contraction differ. In all cases the response measures to outbreaks could affect labor productivity in the short and medium run seriously, though in the long-term productivity could improve after households and firms have adjusted to the new normal. Examples in this tradition include those of Lee and McKibbin (2003), Chou et al., (2003), Chou et al., (2004), Chang et al. (2004), Keogh-Brown et al (2010), World Bank (2014) and Fofana et al. (2015).

More specifically on COVID-19, McKibbin and Fernando (2020a,b) use a global hybrid of a CGE model and a Dynamic Stochastic General Equilibrium (DSGE) model and find GDP losses ranging from 283 to 9170 billion USD worldwide depending on the epidemiological scenario

assumed. Similarly, the European Commission expects global trade to fall by 10–16% in 2020 using analysis based on the Modelling International Relationships in Applied General Equilibrium (MIRAGE) and Global Trade Analysis Project (GTAP) CGE models (European Commission 2020) while Maliszewska et al. (2020) use the Environmental Impact and Sustainability Applied General Equilibrium Model (ENVISAGE) CGE model and register a fall in global GDP by 2% due to COVID-19. In Africa, the work of Chitiga-Mabugu et al (2020) on South Africa shows that, in a mild scenario, GDP falls by 10% and by 14% in a more severe scenario. Their modelling uses a static CGE model to assess the impact of the pandemic. Using a dynamic CGE model, van Heerden and Roos (2020) predict a 10% reduction in GDP from the lockdown effects in South Africa. Other recent examples of CGE models applied to the COVID-19 pandemic include Birch (2020), Calvin et al (2020), Keogh-Brown et al (2020), Zidouemba et al (2020) and Calvin et al (2020) among others.

There is a growing body of literature available on the application of CGE models in the context of gender gaps. Examples include the earlier work of Laderchi et al. (2010) employing CGE analysis approach to quantify the costs as well as financing methods of gender-gap reducing policies in areas such as wage discrimination, education/health gaps and home production. More recent work in this tradition includes the World Bank with applications to Guinea and Niger (World Bank 2019; 2018; 2015). This was followed by work that differentiated labour markets by gender, formal or informal status, endogenised female labour force participation and introduced social reproduction services explicitly in CGE models (see for example Arndt and Tarp 2000; Fontana and Wood 2000; Siddiqi 2005; Sinha and Sangita 2003). Within these types of models, an important extension was an integrated CGE microsimulation model for South Africa that explicitly modelled non-market activities and gender decomposition that was employed by Cockburn et al. (2007) to analyse gendered poverty and inequality impacts of trade liberalisation. This work heavily relied on linking data from a Time Use Survey data to a Social Accounting Matrix following on the footsteps of work by Fontana et al. (2001) and Fontana and Wood (2000) recognising the importance of domestic work in CGE models. Similar work in this tradition includes (Chitiga et al. 2010; Fofana et al. 2009; Cockburn et al. 2009; Cicowiez et al. 2018; Severini et al. 2018; among others). Recently, working with a CGE model in sequence with a microsimulation model, Chitiga et al. (2020) conclude that women are hit harder economically than men, due to the COVID-19 pandemic impacts on the economy. This is caused by the relatively lower skills for women workers compared to men, as well as the sectors in which women predominate in employment, which suffer more than those that men are mainly employed in. Female headed households' poverty increases more than that of male headed households because of the harsher income effect on women workers, and because female headed household poverty was already higher than that of male headed households before the pandemic. Escalante and Maissonave (2021) and Maisonnave and Cabral (2020) provide further gendered impacts of COVID-19 responses for Bolivia and Senegal respectively.

There are important lessons to draw from this literature. It is important to ascertain the important transmission channels of a shock or policy in a particular country. In the case of the COVID-19 pandemic, short to medium term channels would include those associated with consumer

demand, domestic and international trade, and domestic and foreign investments. In the long term, it will be productivity, labour supply, savings and investments. The choice of whether to include effects of nonprivate medical expenses depends on the number of confirmed cases and the related spending. It also emerged from the literature that results are sensitive to the choice of simulation. It is important to note that most of the studies cited above do not focus on research on gendered impacts of pandemics such as COVID-19 though as argued by Kabir and Dudu (2020), subject to data availability, gendered CGE analysis can yield important results giving gender-differentiated economic impact by sector accounting for both direct and indirect effects of COVID-19 and policy responses. Furthermore, it is important to mention that due to lack of time use surveys in many countries, extensions that consider unpaid work are not always possible, which is particularly relevant for the analysis of women's work and time constraints. However, even when data on households allow a disaggregation between male headed and female headed households in the CGE, it has to be considered, that the decision making itself is not necessarily determined by the gender of the household's head. In some countries this simplification does not apply and limits for some countries the representativeness of the modelled households.

Summing up, it is clear from the preceding survey of the relevant literature that CGE modelling work on pandemics is still in its infancy and require more attention and assessments. For our study, given that the disease has only started recently, there are no long term data series as yet. Compounding this would be the high uncertainty associated with the future epidemiological path of the disease. Zimbabwe currently has relatively low infection rates and deaths from the pandemic and as a result modelling the direct health effects of the disease is not pursued further. Instead, we propose integration of transmission channels associated with the short to medium term economic impact of COVID-19. Similarly, little is found in the literature on the extent to which COVID-19 and national level mitigation and recovery policy has responded to the need to address poverty and inequality within socio-economic groups and regions. While there is emerging work focusing on poverty and inequality impacts, this is mainly addressed through groups and regions and gendered impacts are still very few. Comprehensive and deeper assessment of the impacts of COVID-19 as well as national mitigation and recovery response measures on female labour and access to food, water and energy security; access to basic services (clean water and sanitation, health, education, etc.); protection against/reduction of risks of natural disasters, among others, is needed. This will require analytical frameworks that allow for systematic integration of the gendered interlinkages and impact pathways, an aim we attempt to pursue in the next section.

5. Data

5.1 The Social Accounting Matrix

A Social Accounting Matrix (SAM) is a square matrix that describes the transaction flows taking place within an economy during a given period of time. The SAM used for the model is a 2013 SAM for Zimbabwe (Davies et al., 2018). The SAM describes 36 industries, 48 commodities including 7 agricultural commodities. It has 9 accounts for factors and 6 institutional accounts, including 1 account for the rest of the world. Using the SAMBAL method by Lemelin et al (2013), the SAM was updated to 2019. The labour market was split into male and female using the Women and Men report for 2019 (ZIMSTAT, 2019b) that gives the earnings by activities for both male and female workers.

Table 17 presents an aggregated version of the SAM used as data base for the CGE model aggregated for the industries (a) and commodities (c) into: agriculture, fishery, forestry (i.e., a agri, c agri), mining of coals, metals and other minerals (i.e., a mini, c mini), manufacturing (i.e., a manu, c manu), services (i.e., a serv, c serv). The SAM presents the accounts for the production factors male and female labour (i.e., Male, Female) and capital (i.e., flnd, fcap-agri, fcap-nonag). As agents the SAM differentiates households (i.e., HH), enterprises (i.e., ent), the government (i.e., gov) and the rest of the world (i.e., ROW) In the next project phase the agent household will be further disaggregated into male and female headed households.

Table 13: Macro SAM for Zimbabwe (in millions of USD)

	a agri	a mini	a manu	a serv	c agri	c mini	c manu	c serv	trc	Male	Female	flnd	fcap-agri	fcap-nonag	HH	ent	gov	ROW	dtax	atax	stax	mtax	s-i	dstk	total
a agri	0	0	0	0	2555	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2555
a mini	0	0	0	0	0	1679	6	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1697
a manu	0	0	0	0	29	56	2629	258	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2971
a serv	0	0	0	0	0	0	0	12290	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12290
c agri	127	0	773	81	0	0	0	0	0	0	0	0	0	0	607	0	0	1320	0	0	0	0	0	181	3089
c mini	13	118	133	49	0	0	0	0	0	0	0	0	0	0	1	0	0	1497	0	0	0	0	0	181	1992
c manu	660	185	549	1591	0	0	0	0	0	0	0	0	0	0	6762	0	0	425	0	0	0	0	1327	-357	11142
c serv	431	36	19	3194	0	0	0	0	1016	0	0	0	0	0	5534	0	2862	408	0	0	0	0	426	0	13926
trc	0	0	0	0	244	213	559	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1016
Male	561	702	654	2981	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4898
Female	192	54	168	1779	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2193
flnd	153	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	153
fcap-agri	391	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	391
fcap-nonag	0	576	655	2500	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3731
HH	0	0	0	0	0	0	0	0	0	4898	2193	153	391	288	0	1124	0	1219	0	0	0	0	0	0	10266
ent	0	0	0	0	0	0	0	0	0	0	0	0	0	3443	0	0	0	0	0	0	0	0	0	0	3443
gov	0	0	0	0	0	0	0	0	0	0	0	0	0	0	437	65	0	126	1308	188	1575	362	0	0	4061
ROW	0	0	0	0	236	8	6269	1171	0	0	0	0	0	0	20	379	801	0	0	0	0	0	0	0	8885
dtax	0	0	0	0	0	0	0	0	0	0	0	0	0	0	661	647	0	0	0	0	0	0	0	0	1308
atax	27	25	21	116	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	188
stax	0	0	0	0	16	36	1327	196	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1575
mtax	0	0	0	0	9	1	352	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	362
s-i	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-3756	1227	398	3889	0	0	0	0	0	0	1758
dstk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	5
total	2555	1697	2971	12290	3089	1992	11142	13926	1016	4898	2193	153	391	3731	10266	3443	4061	8885	1308	188	1575	362	1758	5	0

5.2 Micro-economic data for analysis of poverty and inequality microsimulations

As base data for this micro economic analysis, we use the data from the household survey provided by the Poverty, Income, Consumption and Expenditure Survey (PICES) of the year 2017 (ZIMSTAT 2018). These data include a data set provided to be used for poverty analysis. Based on the household survey data from 2017 we define the year 2017 as base year for the poverty analysis.

To convert the number of surveyed households into a representative sample we replicated the data entries by using an individual household weight. The sample with the replicated data sets contains, 3.1 million observations and serves as data base for the poverty analysis and the micro simulations. In this study we execute the micro simulation and the poverty analysis for the 3.1 million households. In the next project phase, we will differentiate the sample according to socio-economic attributes (e.g., gender).

6. Methodology

Zimbabwe has been mired in long standing economic and social issues that have been exacerbated by the COVID-19 pandemic. As alluded to earlier, government has responded to the challenge by instituting measures to mitigate the short-term impact of the crisis and in November 2020, a 5-year development and recovery plan was announced. This study uses a two-layer economic model to assess the likely economic impacts of COVID-19, mitigation and recovery measures in Zimbabwe.

6.1 CGE Model

The first layer consisting of the macro model uses the PEP 1-t model from Decaluwé et al (2013) to evaluate the impacts of the COVID-19 and the mitigation measures on the economy of Zimbabwe.

The model was adjusted to follow some Zimbabwean stylized characteristics. In line with the SAM, our model includes 36 activities and 48 products. Each activity uses labour, capital and intermediate consumption to produce. Our model distinguishes 2 two types of labour (Male and Female). Each activity uses both types of labour, but in different proportions. For example, mining is relatively more intensive in male labour, while in service sectors the share of women is relatively high. Technically, the production function is a nested function at 3 levels. At the first level, output is a Leontief-type function between value added and intermediate consumption. Value added is a CES-type function between composite labour and capital. At the last level, composite labour is a CES-type function between Male and Female labour. Composite capital is a CES function between land and agricultural capital for agricultural sectors.

The model distinguishes four different institutions, namely households, firms, government, and the rest of the world. Households derive their income from labour, capital, and transfers. They spend most of their income on final consumption with the rest of the income spent on direct taxes, transfers to other economic institutions, and savings.

Corporate income is derived from capital income and transfers from other agents. They distribute dividends to other agents, pay corporate taxes, and save the rest. Governments collect direct taxes from households and firms, indirect taxes (such as taxes on production, consumption taxes and import duties) and receive transfers from other institutions (dividends, social contributions, etc.). The government then spends its revenues mainly on non-market sector production

(education, health, public administration) and makes transfers to other institutions (pensions, household subsidies). Public savings is the difference between government's income and its spending.

To link Zimbabwe and the rest of the world, the traditional CGE modeling approach is used, in which trade is modeled based on the assumption of imperfect substitutability of products given their origin (the Armington hypothesis). With respect to exports, we assume that Zimbabwean producers can sell their production either on the local market or on the international market. However, we assume that they cannot export as much as they wish and that if they want to increase their share of the world market, they must be more competitive than other international producers. Technically, this means that we assume a finite elasticity for export demand that reflects the competitiveness of local producers in international markets.

In terms of closures, we assume that the nominal exchange rate is the numeraire of the model. Next, the small-country assumption is retained for Zimbabwe, and consequently world prices are exogenous. We also assume that the current account balance is fixed. We assume that labour is mobile across sectors while capital is sector specific. The stock of capital increases between periods given the new investments in the sectors. The new investment is allocated to the different sectors following the approach of Jung and Thorbecke (2005). Labour supply increases at the population growth rate. Finally, government expenditures are assumed to be fixed.

To simulate a BAU scenario, we assume a regular path with a population growth rate at 3%. The results of the simulations will be compared to this BAU.

6.2 Micro-simulation model and poverty analysis

By using CGE models alone we cannot fully analyse the distributional impacts. Thus, the second layer uses a micro-simulation model framework to analyse the distributional impacts of the COVID-19 pandemic and policy simulations on poverty and inequality[6] at the individual household level. In a nutshell, the percentage changes on households' total consumption and consumer price indices from the macro model are passed onto the micro household data derived from the Poverty, Income, Consumption and Expenditure Survey (PICES) of the year 2017[7]. We compute the Foster–Greer–Thorbecke (FGT) indices oriented to the Zimbabwe Poverty Report 2017 (ZIMSTAT, 2019b). ZIMSTAT (2019b) computes the poverty indices to measure poverty in two ways: (i) as total consumption poverty related to the minimum consumption of food- and non-food commodities and (ii) as food poverty, related to the minimum consumption of food.

[66] Inequality analysis is still a work in progress and will be presented in the final report.
[7] Note that Zimbabwe does not have a Time Use Survey that could have been handy for granular time use within household analysis shedding important insights on the gender analysis.

For the total consumption poverty, the poverty indices are computed by using a Total Consumption Poverty Line (TCPL). The TCPL is the benchmark for the values of minimum expenditures (per head), which the households consume in terms of food- and non-food items. Households with expenditures (per head) higher or equal to the benchmark of TCPL are not considered as poor, households with expenditures (per head) smaller than the TCPL are considered as poor. The TCPL can be also called the upper poverty line. The lower poverty line represents the minimum consumption expenditure necessary to feed each household member with a minimum of calories (i.e., 2100 calories), if all expenditures were used for food. This poverty line is called Food Poverty Line (FOPL). Households with expenditures lower than this benchmark are considered as extremely poor, since they cannot even afford to sufficiently feed the household members (ZIMSTAT, 2019b). As poverty indices we compute the three Foster–Greer–Thorbecke indices: FGT0, FGT1 and FGT2. The index FTG0 measures the prevalence of poverty (also called headcount index), how many households are poor (below the benchmarks) compared to the total of households. The index FTG1 measures the depth of poverty indicating how far below the poverty line the poor households are. Also called the poverty gap index. The index FTG2 measures the poverty severity, by not only considering the distance of the poor households to the poverty line, but also considering the inequality among the poor households (also called squared poverty gap index). To measure inequality, we compute the Gini index. The value for the Gini lies between 0 and 1. The Gini index measures, if the wealth or income is distributed equally among many people (with a small value for the Gini index) or unequally distributed with most of the income for small number of people (indicated by a high value for the Gini index) (ZIMSTAT, 2019b). For more technical details on the executed analysis of poverty and inequality and the micro-simulation please see Appendix A.

7. Applications and Results

7.1 Scenario design

The COVID-19 pandemic affects economies in many different ways that operate through international and domestic channels. For this study and following from 2020 Mid-Year Budget Review, the following channels are deemed most relevant in translating impact of the pandemic to the Zimbabwean economy[8]:

- Lower commodity demand and international commodity prices for specific commodities;
- Reduced tourist arrivals due to travel restrictions;
- Disruption of global supply chains for both raw materials and final products and services;
- Reduced remittances from abroad.

COVID-19 impact scenarios

The transmission channels identified above are used to construct the COVID-19 scenarios. Proposed scenarios operate through international and domestic channels. There are two scenarios based on the international transmission channel. The *first* set of these scenarios assumes that COVID-19 pandemic affects the economy through change in international price of primary commodities *(price shocks)* and global market disruption *(global conditions and access)*. The *second* international channel-based scenario is via remittances. Zimbabwean households rely heavily on remittances from non-residents (relatives or friends residing and working overseas etc.), based predominantly in South Africa, United Kingdom, and United States. This scenario assumes that due to COVID-19 pandemic, these remittances decline. Data on remittance flows shows a slight decline by 4.9% in 2020 (Government of Zimbabwe, 2020b).

There are two scenarios proposed on the domestic channels based on impact of the pandemic on *worker productivities* and classification of sectors according to their *degree of exposure to the shock*. Because of disruptions caused by the pandemic, it is anticipated that the majority of the population is forced to stay at home or work remotely. Most low skilled workers lack the means to work remotely which means that during lockdown they are largely unproductive sitting at home. Because they are at home, the capital installed at the work place is underutilised during lockdown and so there is decreased productivity of factors of production. We assume that this impacts the production of all sectors, although with different intensities. Based on 2020 Mid-Year Budget Review and 2021 National Budget Statement, as well as the pronouncements of the government on essential and non-essential sectors during lockdown, the sectors of the economy are classified according to their degree of exposure to the shock in Table 18. Sectors are classified according to whether they are severely affected, largely affected, moderately affected or mildly affected. Finally, as in Chitiga-Mabugu et al (2020) we anticipate that an increase in

[8] Other channels include slowing down of global financial flows including credit availability, remittances and portfolio investments, currency volatility and inflation. Modelling these is beyond the scope of this current study.

local transport costs during the pandemic due, for example, to the fact that it now takes longer than before to fully load a track.

Table 18: Degrees of sector impact from COVID-19 pandemic

Sector	Severely Affected	Largely Affected	Moderately Affected	Mildly Affected
Agriculture			Agriculture	
Mining and quarrying	Mining			
Manufacturing		Non-Food Manufacturing		Foodstuffs Manufacturing
Electricity and Water				Electricity and Water
Services	Distribution, Hotels and Restaurants	Financial Services	Education	

Source: Author computations based on Government of Zimbabwe (2020b)

A mild and a severe scenario are then designed (see for example Calderon et al. (2020)) for different scenarios on the global economy. The **mild** scenario assumes that the economy is affected by the pandemic for 2020, 2021 and 2022 then rebounds from 2023 onwards. Under the **severe** scenario, it is assumed the economy is affected from 2020 to 2023, and then rebounds from 2024 onwards. The mild and severe scenarios are meant to simulate the path of possible recovery paths for the economy in the absence of any other exogenous changes or reform[9]. As discussed and agreed during a meeting with Zimbabwean policy makers and stakeholders during a meeting on 11 January 11, 2021, the magnitudes for the mild scenario would be kept the same in 2020 and 2021. For the severe scenario, the shocks applied in 2020 are the same as in the mild scenario and they start to increase in 2021. The scenarios are summarised in Tables 19 and 20, using the assumptions in Table 18.

[9] Changes in world commodity prices for the mild scenario are obtained from Fofana and Sall (2020).

Table 19: Hypothesis for the Mild scenario

	2020 and 2021	2022
International channels		
Decrease in exports	-10% for all commodities	-5% for all commodities
Decrease in world price of commodity exports	-4.7% for primary commodities	-2% for primary commodities
Decrease in world prices of primary commodity imports	-25.8% for primary commodities	-15% for primary commodities
Decrease in remittances	-4.9%	-2.5%
Domestic channels		
Decrease in productivity for the sectors	- 1% for mildly affected -2 % for moderate -3 % for largely affected -4 % for severely affected	- 1% for mildly affected -2% for moderate -2% for largely affected -3% for severely affected
Increase in transportation cost	2%	

Table 20: Hypothesis for the severe scenario

	2020	2021	2022	2023
International channels				
Decrease in exports (all commodities)	-10%	-12%	-8%	-5%
Decrease in world price of primary commodity exports	-4.7%	-4.7%	-2%	-1%
Decrease in world prices for imports	-25.8%	-25.8%	-20%	-10
Decrease in remittances	-4.9%	-6%	-3%	-1%
Domestic channels				
Decrease in productivity for the sectors	- 1% for mildly affected -2 % for moderate -3 % for largely affected -4 % for severely affected	- 2% for mildly affected -5% for moderate -10% for largely affected -15% for severely affected	- 1% for mildly affected -2% for moderate -3% for largely affected -4% for severely affected	- 1% for mildly affected -1% for moderate -2% for largely affected -3% for severely affected
Increase in transportation cost	2%	2%		

COVID-19 mitigation scenario

As discussed earlier, Zimbabwe has implemented a stimulus package intended to scale up production in all sectors, support small-scale industries, improve health facilities and cushion vulnerable groups from negative effects of the pandemic (see Table 3). This will be implemented in the model through a subsidy, transfer or tax cut. The model assumes that the financing for this stimulus would be available to the government and does not simulate a scenario to compensate for the revenue. From the stimulus package, there are some items that are not taken into account in the model because is it not suitable to analyse those, such as the working capital fund, the SME and the liquidity. Table 21, shows the funding proportions for the different items considered in this model. Therefore, we took out these elements from the total budget and computed shares for the different remaining items.

Table 21: Split of the fiscal package for 2020 and 2021 (in % of the total amount)

Agriculture Sector Support	48.0%
Working Capital Fund for Industry	0.0%
Mining Sector Facility	7.9%
SME Support Fund	0.0%
Tourism Support Fund	3.9%
Liquidity from Statutory Reserves	0.0%
Health Sector Support Fund	7.9%
Broad Relief Measures	11.8%
COVID Cash Transfer	18.9%
Arts and Sport Grant	1.6%
Total	100%

Source: Author computations based on Government of Zimbabwe (2020b)

COVID-19 recovery scenario – NDS1

The next set of scenarios is on sustained economic recovery. As mentioned earlier, government recently launched the second *"leg"* of the reform and development agenda –NDS1, running from 2021 to 2025. The recovery scenarios in this study relates to the implementation of proposed policies and strategies aimed at boosting general economic recovery and revival in the short to medium term. Key insights contained in NDS1 and Mid-Term Budget Review (Government of Zimbabwe 2020b) are used to choose the policies simulated. Transparency International's recent report highlights various institutional weaknesses, at least in relative terms that if addressed, would boost Zimbabwe's investment climate increasing the country's desirability as an investment destination. Proposed actions include reforms such as improved infrastructure, safety

and security, investment promotions/campaigns and ease of doing business. To design the scenario, we assume the government is setting up subsidies on investment for all private sectors. This subsidy makes the sector more profitable and therefore private investors are encouraged to invest in the sector. With an increase in investment, the stock of capital of the sector should increase the following year, and given this new capital, the sector will hire new workers to produce more. We simulate a three-year plan, from 2022 to 2024. The total amount of subsidies is taken from the Government of Zimbabwe (2020b) and represented as a percent of GDP for 2022 (5.7%), 2023 (5.8%) and 2024 (5.75%).

COVID-19 recovery scenario – Government gender policies

The final scenario includes all elements of scenarios above and adds what we call 'gender policy elements'. Although not explicit in the NDS1, for this scenario, gender intensive sectors, as represented by the share of the wage-bill in Table 22, would benefit more from the investment subsidies than other sectors.

Table 22: Share of men and women for the wage bill per sector in 2019

Industrial Sector	Men	Women	Industrial Sector	Men	Women
Agriculture, forestry and fishing	74.5%	25.5%	Financial activities	62.9%	37.1%
Mining and quarrying	92.8%	7.2%	Insurance activities	62.7%	37.3%
Manufacturing	79.6%	20.4%	Real estate activities	86.7%	13.3%
Electricity, gas, steam and air conditioning supply	67.9%	32.1%	Professional, scientific and technical activities	48.3%	51.7%
Water supply; sewerage, waste management and remediation activities	78.4%	21.6%	Administrative and support service activities	77.7%	22.3%
Construction	94.6%	5.4%	Public administration and defence; compulsory social security	60.6%	39.4%
Wholesale trade	76.4%	23.6%	Education	42.1%	57.9%
Retail trade; sale and repair of motor vehicles and motor cycles	55.3%	44.7%	Human health and social work activities	39.0%	61.0%
Transportation and storage	92,3%	7.7%	Arts, entertainment and recreation	86.4%	13.6%
Accommodation and food service activities	57.9%	42.1%	Other service activities	66.7%	33.3%
Information and communication	66.8%	33.2%	Activities of households as employers undifferentiated goods- and services-producing activities of households for own use	34.9%	65.1%
Activities of extraterritorial organizations and bodies	41.9%	58.1%			

Source: ZIMSTAT (2019a)

7.2 Preliminary macro simulation results

This section presents the results from the model simulations, focussing on the macroeconomic results under the mild and severe scenarios for the case with and without government intervention. The results are reported in terms of the impact on economic growth, employment, sectoral output, institutions (government, firms, rest of the world and households) and how they deviate from the business as usual (BAU) economic path that traces the path of the economy had there not been a COVID-19 shock. Based on the assumptions made, Table 23 summarise the main macroeconomic impacts of the pandemic.

Table 23: Impacts on selected macroeconomic indicators in percentage change from BAU.

	MILD-COVID		SEVE-COVID		MILD-MITIG		SEVE-MITIG		MILD-RECOV	SEVE-RECOV
	2021	2025	2021	2025	2021	2025	2021	2025	2025	2025
GDP real	-5.5	-1.2	-13.5	-2.3	-4.3	-2.2	-12.0	-3.1	-1.0	-1.9
Total investment	-20.2	-1.7	-33.5	-3.9	-60.0	-3.2	-70.5	-4.4	-1.5	-2.8
Consumer price index	0.7	0.8	5.9	1.4	1.6	1.6	7.1	2.2	0.9	1.6
Household Real consumption	-3.8	-0.3	-7	0.7	1.1	-0.60	-1.9	-0.9	-0.1	-0.4
Unemployment rate men [a]	4.02	0.12	7.23	0.39	2.42	0.25	4.99	0.36	0.01	0.14
Unemployment rate women [a]	1.90	0.25	4.68	0.51	-0.18	0.47	2.41	0.66	0.22	0.42

Source: Simulation results.

Notes: MILD-COVID = Scenario assuming mild impacts and fast recovery shock from COVID-19, SEVE-COVID = Scenario assuming severe impacts and longer lasting recovery shock from COVID-19, MILD-MITIG = Scenario MILD-COVID with mitigation measures, SEVE-MITIG = Scenario SEVE-COVID with mitigation measures, MILD-RECOV = MILD-MITIG with recovery measures, SEVE-RECOV = SEVE-MITIG with recovery measures. a) Unemployment rate men and unemployment rate women in percentage points.

Table 23 shows that macroeconomic impacts of the COVID-19 pandemic are substantial since the economy simultaneously gets affected on the demand and the supply side. This combined effect results in a reduction by 5.5% in GDP for 2021 in the mild scenario and 13.5% in the severe scenario (Table 23). Without any government mitigation measures, what is striking is that even after five years, the GDP levels are still below the BAU levels under both COVID scenarios. The severe scenario shows a steeper decline in GDP growth compared to the mild scenario, as expected, with a decrease in GDP of 1.2% in the mild scenario and 2.3% in the severe scenario compared to the BAU in 2025. The persistence in economic decline is an indication of the need for intervention.

The decline in the economy, together with the original shocks, cause an increase in unemployment. Indeed, under the COVID-19 scenarios, the economy is affected on one side by the drop in primary exports prices and quantities, a drop in remittances that directly affect household's disposable income, and by a reduction of the production supplied given the lockdown and the socially distancing measures applied in the country. Consequently, firms face a decrease of their production and therefore lay off workers leading to an increase of the unemployment rate by 4-percentage point for men and 1.9 for women in 2021 under the mild scenario. This suggest that directly after the shock, female workers are relatively less impacted than male workers. However, in 2025 the increase in the unemployment rate is slightly higher for women than for men.

This impact on employment has negative impact on households' income which rely heavily on labour income. Indeed, labour income represents 69% of total households' income. Together

with the drop in remittances (which represents 11% of their income), this drop in their labour income leads to a drop of their total income, reducing their real consumption by 3.8% in the mild scenario. Without any mitigation scenario, we can see that the negative impacts continue overtime, even if we assume that the economy goes back to normal in 2022 in the mild scenario. At the end of the period, the economy is still performing below the BAU levels.

Under the second set of scenarios, the government implements a mitigation plan in 2021 as explained in the previous section. The mitigation plans offer some relief to the activities and provides cash transfers to households and firms. As shown in Table 22, in 2021 the mitigation measures help to reduce the GDP losses by 1.2 percentage points in the mild scenario and by 0.5 percentage points in the severe scenario. In terms of unemployment, the mitigation measures clearly help to reduce the unemployment for men and women. The unemployment rate for women is even further reduced compared to the BAU in 2021, which means that the mitigation measures result in sectors hiring more women than in the baseline, as some targeted sectors are women intensive. Thus, on the macroeconomic level, it is clear that the mitigation measures clearly help households and the different activities. However, the fiscal package is sharply decreasing government savings which is reducing total investment, hampering growth in the long run. Under the COVID-19 scenarios, investment is already decreasing, but in the mitigation scenario, if the fiscal package provides some relief in the short term, the consequences on total investment in the long run are dramatic.

The recovery scenario is implemented from 2022 to 2024 and consists of subsidizing investment to all the private sectors. In the long run, this plan is helping the economy as the GDP reduction relative to the BAU is now only 1%. In other words, when we compare the scenarios between each other, the recovery scenario increases GDP by 1.2 percentage point compared to the mitigation scenario in the case of a mild shock.

Table 24 presents the sectoral results. All the sectors of the economy see their production declining, and the magnitude of the decline will depend on whether the sectors are export-oriented and/or if they are defined as essential or not in the economy and therefore are differently affected by lockdown measures. Two of them are particularly hit: the mining sector and the construction sector. Indeed, these sectors face, in addition to lockdown measures, a decrease in world prices for the mining sector, and a drop in the investment for the construction sector.

Table 24: Impacts on the production and labour demand in selected sectors in percentage change from BAU.

	MILD-COVID		SEVE-COVID		MILD-MITIG		SEVE-MITIG		MILD-RECOV	SEVE-RECOV
	2021	2025	2021	2025	2021	2025	2021	2025	2025	2025
Production										
Agriculture Large Scale farming	-9.2	-0.2	-15.6	-0.9	0.5	-0.1	-5.5	-0.4	-4.3	-4.3
Agriculture Small Scale Farming	-4.4	-2.3	-9.9	-4.0	1.0	-4.4	-4.9	-5.9	6.8	4.4
Mining	-12.2	-1.8	-25.7	-3.5	-6.3	-2.9	-19.2	-4.1	-2.3	-3.5
Food	-4.8	-1.0	-7.7	-1.8	5.4	-1.6	2.4	-2.3	0.2	-0.6
Construction	-15.0	-2.4	-32.4	-4.7	-35.8	-4.4	-49.6	-5.9	-3.3	-4.9
Buisness	-3.6	-1.0	-9.2	-1.8	-0.2	-2.0	-5.9	-2.8	-1.3	-2.1
Total labour demand										
Agriculture Large Scale Farming	-9.9	1.3	-15.3	1.7	4.4	2.4	-0.1	3.2	-10.3	-8.6
Agriculture Small Scale Farming	-3.6	-1.4	-8.6	-2.5	6.8	-2.9	1.2	-3.8	3.0	1.7
Mining	-13.7	0.1	-20.5	-0.4	-2.8	-0.1	-7.4	-0.1	0.2	0.1
Food	-5.6	0.7	-9.1	0.9	12.5	1.2	9.0	1.6	3.3	3.5
Construction	-15.1	-1.5	-27.2	-3.3	-43.4	-2.9	-52.6	-4.1	-1.0	-2.4
Buisness	-0.3	0.3	2.4	0.4	6.1	0.6	9.1	0.7	0.8	0.9

Source: Simulation results.

Notes: MILD-COVID = Scenario assuming mild impacts and fast recovery shock from COVID-19, SEVE-COVID = Scenario assuming severe impacts and longer lasting recovery shock from COVID-19, MILD-MITIG = Scenario MILD-COVID with mitigation measures, SEVE-MITIG = Scenario SEVE-COVID with mitigation measures, MILD-RECOV = MILD-MITIG with recovery measures, SEVE-RECOV = SEVE-MITIG with recovery measures

Less impacted are agriculture food and businesses sectors. Without mitigation measures the less impacted sectors (except small scale farming) reach close to the output of the baseline. Small scale farming, mining and construction sectors face higher production losses in 2025. The mitigation measures help most of the sectors to reduce the losses in 2021 and in 2025. However, the construction sector is hit more severely because of the public funds that have been spent in mitigation measures and not into investments. The total labour demand reacts accordingly, laying off more workers from the sectors which reduce their production more strongly. More men than women are working in mining and construction sector, whereas women are more representative in the less impacted sectors of agriculture and food production. Thus, in 2021 the unemployment rate for men decreases more (Table 23). The recovery scenario clearly helps the sectors to get back to some productivity. Given the subsidies on investment, investments increase in the private sectors, and increase the stock of capital of the sectors the following year. With an increase in the stock of capital, the sectors can hire more workers to produce more, leading to a positive impact on employment.

Table 25 presents the impacts on institutions. The increase in unemployment rates and drop in wage rates in the sectors lead, in 2021, to a decrease in income of households and consequently,

to a drop of their consumption as presented in Table 24. In 2021, firms' income is decreasing given the decrease in capital income, and so are its savings. Government's income is decreasing during the pandemic, in the mild and severe scenarios, given the reduction in the receipts from direct and indirect taxes. Overall, total savings in the economy is decreasing leading to a drop in total investment.

In the mitigation scenario, the income of households increases due to increased income from transfers from the government as part of the mitigation measures. The incomes of firms and of the government recover in 2025 in the mild and severe scenarios with and without mitigation measures (see Table 25).

Table 25: Impacts on households, firms and government in percentage change from BAU.

	MILD-COVID		SEVE-COVID		MILD-MITIG		SEVE-MITIG		MILD-RECOV	SEVE-RECOV
	2021	2025	2021	2025	2021	2025	2021	2025	2025	2025
Households										
Total income	-5.0	0.4	-5.1	0.3	3.1	0.6	4.1	0.9	0.8	1.0
Income from labour	-5.1	0.5	-5.5	0.6	-1.3	1.0	-0.6	1.4	0.8	1.2
Income from capital	-4.9	-0.5	-4.0	-1.2	2.5	-1.0	4.3	-1.3	2.8	2.3
Income from transfers	-4.8	0.1	-4.2	0.0	16.9	0.2	18.1	0.3	0.1	0.2
Savings	1.4	0.9	7.2	1.5	1.4	1.7	7.5	2.4	1.0	1.7
Firms										
Income from transfers	-4.8	0.2	-2.3	0.0	-0.5	0.3	3.3	0.5	0.1	0.3
Disponsable income	-4.8	0.2	-2.3	0.0	-0.5	0.3	3.3	0.5	0.1	0.3
Government										
Total income	-6.0	0.0	-7.1	-0.3	-13.0	0.1	-13.1	0.1	0.2	0.2
Income from transfers	-3.9	0.4	-2.6	0.5	2.6	0.8	4.8	1.1	0.8	1.1
Income from other taxes on production	-6.5	0.1	-7.9	-0.3	-186.5	0.1	-186.7	0.2	0.1	0.1
Income from other taxes on products and imports	-7.4	-0.2	-10.9	-0.8	-11.0	-0.4	-13.3	-0.6	-0.2	-0.4

Source: Simulation results.

Notes: MILD-COVID = Scenario assuming mild impacts and fast recovery shock from COVID-19, SEVE-COVID = Scenario assuming severe impacts and longer lasting recovery shock from COVID-19, MILD-MITIG = Scenario MILD-COVID with mitigation measures, SEVE-MITIG = Scenario SEVE-COVID with mitigation measures, MILD-RECOV = MILD-MITIG with recovery measures, SEVE-RECOV = SEVE-MITIG with recovery measures

Finally, we have proposed an alternative recovery scenario with a gender-orientation on top of the recovery. In this scenario, the sector "other services", which is the most female intensive sector, is granted a higher subsidy to investment. The subsidy in the most female intensive sector is equal to 0.33 in 2022, while it is equal to 0.31 in the other sectors. The results that are reported in Table 26 show very insignificant impacts, only showing differences only at the 5th figure after the decimal. Thus, this maybe an ineffective intervention for addressing gender inequities. This scenario requires further work in terms of refinement and focus which will be done for the next revised paper. This could include for example increasing the scale of the intervention, refocusing the scenario to address certain women specific needs in infrastructure such as electricity and water, transportation etc. Finally, direct support through wage or transfers can also be explored.

Table 26: Macroeconomic impacts of the 'gender friendly' scenario in percentage change from BAU.

	MILD-GENDE	SEVE-GENDE
	2025	2025
GDP real	-1.0	-1.9
Total investment	-1.5	-2.8
Consumer price index	0.9	1.6
Total household consumption	-0.1	-0.4
Unemployment rate men [a]	0.01	0.14
Unemployment rate women [a]	0.22	0.42

Source: Simulation results.

Notes: MILD-COVID = Scenario assuming mild impacts and fast recovery shock from COVID-19, SEVE-COVID = Scenario assuming severe impacts and longer lasting recovery shock from COVID-19, MILD-MITIG = Scenario MILD-COVID with mitigation measures, SEVE-MITIG = Scenario SEVE-COVID with mitigation measures, MILD-RECOV = MILD-MITIG with recovery measures, SEVE-RECOV = SEVE-MITIG with recovery measures. MILD-GENDE = MILD-RECOV with gender-orientated measures, SEVE-GENDE = SEVE-RECOV with gender-orientated measures. a) Unemployment rate men and unemployment rate women in percentage points.

The intervention also needs to be understood against a background that the drop on investment is already quite harsh, and therefore, it is not clear if any extra measure would bring something substantially positive. In the next revised paper we will explore other scenarios, for example, wage subsidies.

7.3 Preliminary micro-simulation results

This subsection uses the impact of COVID-19 effects just outlined at the macro and sectoral level to analyse poverty and inequality effects. This sequential approach, where CGE results are used to compute poverty and inequality, has the advantage of ensuring the poverty outcomes are informed and consistent with the generated macroeconomic results. Table 27a and 27b presents

the values of poverty and inequality index based on the data provided by ZIMSTAT (2018). The simulations represent the years 2021 and 2025. We use the year 2017 as base for the simulation as that corresponds to the date of the PICES data. Indeed, the computed indices for the year 2021 should be representative for the year 2017. However, the comparison with the values published in ZIMSTAT (2019b) show our index overestimate the values provided by ZIMSTAT by one to two percentage points. The Gini index in our computation is 3 percentage points higher than that published by ZIMSTAT (2019b). However, for the analysis of the simulation results, we do not need the same level like ZIMSTAT (2019b). We use the differences between the scenarios and the base to analyse the impacts of the scenarios.

Table 27a: Indices to measure poverty and inequality computed in the simulated scenarios, with mild COVID-19 impact

	ZimStat2019	Base		MILD-COVID		MILD-MITIG		MILD-RECOV	
	2017	2021	2025	2021	2025	2021	2025	2021	2025
GINI	43.5	47.0	47.0	47.0	47.0	47.0	47.0	47.0	47.0
TCPL FGT0	60.6	62.6	62.6	64.6	63.0	62.8	63.5	62.8	62.9
TCPL FGT1	26.9	28.9	28.9	30.5	29.3	29.1	29.6	29.1	29.2
TCPL FGT2	14.7	16.2	16.2	17.4	16.5	16.3	16.7	16.3	16.4
FOPL FGT0	21.9	24.9	24.9	27.2	25.5	25.2	26.0	25.2	25.4
FOPL FGT1	NA	6.4	6.4	7.3	6.6	6.5	6.8	6.5	6.6
FOPL FGT2	NA	2.3	2.3	2.7	2.4	2.3	2.4	2.3	2.3

Source: Simulation results.

Notes: ZimStat2019 = indicators provided by ZIMSTAT (2019b) for the year 2017, Base = indicators computed for the year 2017 as base for the simulated year 2021 and 2025, MILD-COVID = Scenario assuming mild impacts and fast recovery shock from COVID-19, SEVE-COVID = Scenario assuming severe impacts and longer lasting recovery shock from COVID-19, MILD-MITIG = Scenario MILD-COVID with mitigation measures, SEVE-MITIG = Scenario SEVE-COVID with mitigation measures, MILD-RECOV = MILD-MITIG with recovery measures, SEVE-RECOV = SEVE-MITIG with recovery measures.

Table 27b: Indices to measure poverty and inequality computed in the simulated scenarios with severe COVID-19 impact.

	ZimStat2019	Base		SEVE-COVID		SEVE-MITI		SEVE-RECOV	
	2017	2021	2025	2021	2025	2021	2025	2021	2025
GINI	43.5	47.0	47.0	47.0	47.0	47.0	47.0	47.0	47.0
TCPL FGT0	60.6	62.6	62.6	67.9	63.5	66.2	63.8	66.2	63.4
TCPL FGT1	26.9	28.9	28.9	33.3	29.6	31.9	29.9	31.9	29.6
TCPL FGT2	14.7	16.2	16.2	19.6	16.7	18.5	16.9	18.5	16.7
FOPL FGT0	21.9	24.9	24.9	31.2	26.0	29.1	26.4	29.1	25.9
FOPL FGT1	NA	6.4	6.4	9.0	6.8	8.1	6.9	8.1	6.7
FOPL FGT2	NA	2.3	2.3	3.5	2.4	3.1	2.5	3.1	2.4

Source: Simulation results.

Notes: ZimStat2019 = indicators provided by ZIMSTAT (2019b) for the year 2017, Base = indicators computed for the year 2017 as base for the simulated year 2021 and 2025, MILD-COVID = Scenario assuming mild impacts and fast recovery shock from COVID-19, SEVE-COVID = Scenario assuming severe impacts and longer lasting recovery shock from COVID-19, MILD-MITIG = Scenario MILD-COVID with mitigation measures, SEVE-MITIG = Scenario SEVE-COVID with mitigation measures, MILD-RECOV = MILD-MITIG with recovery measures, SEVE-RECOV = SEVE-MITIG with recovery measures.

Table 28 displays the differences of indicators between the scenario and the base. The Gini index is unchanged in the scenarios because, the multiplication of all households of the sample by the same value (i.e., the change of total household consumption), does not change the distribution in a way that it reacts in a change of the Gini index.

Table 28: Change of poverty and inequality indices in percentage points compared to the BAU

	Base		MILD-COVID		SEVE-COVID		MILD-MITIG		SEVE-MITIG		MILD-RECOV		SEVE-RECOV	
	2020	2025	2020	2025	2020	2025	2020	2025	2020	2025	2020	2025	2020	2025
GINI														
TCPL FGT0			2.01	0.37	5.29	0.90	0.20	0.91	3.63	1.25	0.20	0.34	3.63	0.81
TCPL FGT1			1.56	0.39	4.42	0.71	0.17	0.74	2.99	1.03	0.17	0.35	2.99	0.66
TCPL FGT2			1.19	0.30	3.42	0.54	0.13	0.56	2.29	0.78	0.13	0.26	2.29	0.50
FOPL FGT0			2.23	0.53	6.31	1.03	0.22	1.07	4.14	1.50	0.22	0.49	4.14	0.93
FOPL FGT1			0.89	0.22	2.63	0.40	0.09	0.41	1.74	0.58	0.09	0.19	1.74	0.37
FOPL FGT2			0.40	0.10	1.24	0.18	0.04	0.18	0.80	0.26	0.04	0.09	0.80	0.17

Source: Simulation results.

Notes: ZimStat2019 = indicators provided by ZIMSTAT (2019b) for the year 2017, Base = indicators computed for the year 2017 as base for the simulated year 2021 and 2025, MILD-COVID = Scenario assuming mild impacts and fast recovery shock from COVID-19, SEVE-COVID = Scenario assuming severe impacts and longer lasting recovery shock from COVID-19, MILD-MITIG = Scenario MILD-COVID with mitigation measures, SEVE-MITIG = Scenario SEVE-COVID with mitigation measures, MILD-RECOV = MILD-MITIG with recovery measures, SEVE-RECOV = SEVE-MITIG with recovery measures.

The positive difference shows that the poverty index increases in each scenario, which means that in each scenario the status of households' poverty is worse than in the base. This result appears as plausible, since after the COVID-19 pandemic an increase in poverty can be expected even if mitigation or recovery measures are applied. A better status of poverty after the crisis is unlikely as the costs are prohibitively high (e.g., to fund transfers).

Figure 7 presents the development of the poverty indices differentiated by total poverty (on the left) and food poverty (on the right). The three single graphs present the development of each poverty index in the scenarios.

Poverty increases significantly in the year 2021 by all indicators. Particularly in the severe scenario (SEVE-COVID) the poverty headcount index (FGT0) increases by 5 and 6 percentage points. This means that more households fall under total consumption or food poverty line than in the base. In 2025, without implementing any measure, the impact decreases by itself to about 1 percentage point compared to the base.

The mitigation policies in the scenarios MILD-MITIG and SEVE-MITIG help to reduce the increase in poverty significantly by 1 to 2 percentage points in 2021. However, in 2025 poverty increases for all indicators and is higher than in the scenario with only COVID-19 shock and without mitigation policies.

The recovery policies implemented in the scenarios MILD-RECOV and SEVE-RECOV help to decrease the values of the poverty in 2025 to lower values than the scenarios MILD-COVID and SEVE-COVID. Since the mitigation policies are still in force since 2021, the scenarios with both (the mitigation policies and the recovery policies) are the most effective in reducing the increase of poverty in 2021 and in 2025.

Figure 7: Development of poverty indices in comparison to the BAU

Source: Simulation results.

Notes: Left: poverty indices computed for the total poverty (TCPL); Right: poverty indices computed for food poverty (FOPL)

8. Summary and Recommendations

This Updated Research study presents results from a modelling exercise of the impact of alternative COVID-19 mitigation and recovery policies using tailored Zimbabwe simulation models. The study includes a country economic background, the COVID-19 pandemic, a gender section, the scenarios and the results for all the scenarios. The results are split into macro and micro (poverty and inequality) results. The analysis is done nationwide across diverse socioeconomic categories - in particular, gender, with a view to identifying the most affected and vulnerable populations.

The macroeconomic and broad sectoral overview reveals that the ongoing COVID-19 pandemic is having devastating effects on an economy that was already in decline prior to onset of the pandemic. The pandemic is exacerbating further the underlying weaknesses that had been prevalent in the economy resulting in negative economic growth, growing unemployment, poverty and inequality. Measures to contain the pandemic have negatively affected economic activity with mining and services impacted the most. Available evidence and statistical data show that women in particular are in a vulnerable economic situation to the pandemic as the majority of women and woman-led households are facing the biggest impact through income loss, food insecurity and care-giving burdens. The scale of the pandemic recession, the damage it has inflicted on vulnerable populations and communities, and the unequal state of the income distribution that preceded it, that the pandemic is perpetuating, all necessitate a far-reaching effort by government to put the country on a path toward inclusive recovery. In particular, recovery policies with gender focus are required to mitigate the negative impacts from COVID-19 on women. The precarious macroeconomic and fiscal position the country finds itself in poses a major constraint on government's ability to fully mitigate against both the health and economic impacts of the pandemic.

The policy scenarios identified and then simulated in this research study attempt to broadly capture key aspects of proposed interventions by government aimed at mitigating and accelerating the recovery of the economy. All the proposals simulated are informed and are compatible with the country's stimulus package being implemented in order to mitigate the economic consequences of the pandemic, the recently launched NDS1 including its commitment to achieving the country's Vision 2030, SDGs and Africa Agenda 2063. The simulation results at this stage are very interesting and point to interesting policy recommendations. There is a 5% GDP decline in 2020. The mild scenario is harsh, but compared to the severe scenario, it is lower. The mitigation measures are helping, and they are helping women even more. The side effect of the mitigation measures is the impact on investment in the long run. The recovery scenarios help to get the sectors back to production, which is welcome as it leads to an increase in investment. However, although the BAU values are still not reached, the economy gets closer

to reaching where it would have been had there been no COVID-19 pandemic. For the gender scenario, results hardly change. The poverty and inequality results follow similar trends. At this stage the modelled scenario for gender shows that the measure to grant higher subsidies to the most female intensive sector is not very effective. Thus, the policy scenario needs to be refined and other policies in this regard will be investigated in the next updated paper.

Taken together, the findings in this study provide useful information for policymakers. Key policy recommendations to support mitigation, recovery and growth in the short to medium run for Zimbabwe that emerge from this study include:

- Extend, but with a sunset clause, the mitigation measures that were put in place as part of an initial relief/recovery spending package. The mitigation measures have been shown by the modelling exercise to be potentially extremely helpful interventions. However, they need to be time bound as eventually, they lead to reduction in investment which hurts future growth.
- Create and implement a new mechanism, a 'Recovery and Investment-driven Scenario Plan'—that explicitly encourages public investments and enables production diversification, especially by increasing the share of high value exports in total exports and increasing the share of primary imports in total imports. Specific measures to galvanise this strategy could include:
    - More effective implementation of existing production enhancing policies such as those in agriculture, mining and manufacturing sectors (see Government of Zimbabwe, 2020b),
    - Targeted temporary tax breaks or other forms of tax incentives for severely affected firms, especially in tourism and mining,
    - Reduced lending rates, tax and mortgage deferrals, debt rescheduling and salary subsidy,
    - Continued intensification of ongoing reforms such as zero tolerance for corruption, improved safety and security, investment promotions/campaigns and ease of doing business which would likely attack foreign investments,
    - Renewed coordination of activities between government, private sector, civil society and development partners to provide further impetus and a coherent approach to engagement and re-engagement with the international financial economy with a view to get support in the form of cheap/concessional and accessible credit for the plan and private businesses.

These measures need to be enhanced by the more structural measures aimed at increasing the stock of public infrastructure, which in turn will support jobs in major sectors of the economy.

Furthermore, this recommended 'Recovery and Investment-driven Scenario Plan' will need to be complemented by direct gender friendly interventions, possibly in the form of wage support or targeting women specific needs in infrastructure as indirect quotas for women in public procurement, legal remedies to close the gender pay gap and easing the access to funding and provide training opportunities for poor women. This will be explored further in the next revised paper with a view at providing a more rigorous evidence base.

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Appendix A: Microsimulation analysis

-A1.1- Poverty index

We compute the Foster–Greer–Thorbecke (FGT) indices oriented to the Zimbabwe Poverty Report 2017 (ZIMSTAT, 2019b). ZIMSTAT (2019) computes the poverty indices to measure poverty in two ways: (i) as total consumption poverty related to the minimum consumption of food- and non-food commodities and (ii) as food poverty, related to the minimum consumption of food. For the total consumption poverty, the poverty indices are computed by using a Total Consumption Poverty Line (TCPL). The TCPL is the benchmark for the values of minimum expenditures (per head), which the households consume in terms of food- and non-food. Households with expenditures (per head) higher or equal to the benchmark of TCPL are not considered as poor, households with expenditures (per head) smaller than the TCPL are considered as poor. The TCPL can be also called the upper poverty line.

The so-called lower poverty line represents the minimum consumption expenditure necessary to feed each household member with a minimum of calories (i.e., 2100 calories), if all expenditures were used for food. This poverty line is called Food Poverty Line (FOPL). Households with expenditures lower than this benchmark are considered as extremely poor, since they even cannot afford to sufficiently feed the household members (ZIMSTAT, 2019b).

As poverty indices we compute the three FGT indices: FGT0, FGT1 and FGT2. The index FTG0 measures the prevalence of poverty (also called headcount index), how many households are poor (below the benchmarks) compared to the total of households. The index FTG1 measures the depth of poverty indicating how far below the poor households are below the poverty line. Also called the poverty gap index. The index FTG2 measures the poverty severity, by not only considering the distance of the poor households to the poverty line but also considering the inequality among the poor households (also called squared poverty gap index). The difference between FTG1 and FTG2 is that FTG2 weights the sum of the poverty gaps (ZIMSTAT, 2019b).

- A1.2- Inequality index

To measure inequality, we compute the Gini index. The value for the Gini lies between 0 and one. The Gini index measures, if the wealth or income is distributed equally among many people (with a small value for the Gini index) or unequally distributed with most of the income for small number of people (indicated by a high value for the Gini index) (ZIMSTAT, 2019b).

- A1.3- Micro simulation and poverty analysis

To compute the poverty and inequality index for the base year 2017 we used the file “household_final_4_poverty.dta” and selected the variables. “pov_r_pccons_alt”, which represents the total per head consumption expenditure of households for food and non-food in

deflated terms. We define national poverty lines by assigning values to TCPL the value of 70.36USD and for FOPL the value of 31.27USD, according to ZIMSTAT (2019b: 38).

To convert the number of surveyed households into a representative sample we replicated the data entries by using the variable "wt_pov_old". This variable is the individual household weight, retrieved from data set "household_final_1.dta". After the replication we execute the poverty analysis for a number of 3.1 million observations. To compute the poverty indices and the Gini index we use the statistic software R, with the package "ineq" (Zeileis 2014).

For the microsimulation we use macro-economic variables simulated by the CGE model. We multiply the poverty lines by the change of the consumer price index (PIXCON) and we multiply the expenditures of the households by the change of the real total household consumption (CTH_real). To simulate the value of the inequality index we multiply also the Gini-Index by (CTH_real).

After applying the macro-economic indicators from the micro economic data (top-down), we compute the values for the poverty and inequality indicators. The difference between the values for the indicators in the scenarios and the base year informs on the change of poverty and inequality in the scenarios.

To simulate the year 2025, we also use the base year of 2017. The poverty indexes for poverty and inequality are computed for the whole population. A differentiation of households by gender and into rural/urban, will be subject for the next report.

- A1.4- Poverty analysis for the base year

The poverty report by ZIMSTAT (2019b) provides a detailed analysis of different indicators to measure poverty and inequality for the year 2017 and it presents also comparison with historical data for some items. The report provides differentiated information on poverty for gender-headed households with different status: *dejure or defacto* heads. Furthermore, the report informs about poverty of households in rural and urban regions. Thus, ZIMSTAT (2019b) provides a useful base for the envisaged analysis. For the report at hand we restrain the presentation to aggregated results from ZIMSTAT (2019b) (whole population, male-headed and female-headed).

Table A1 shows that for the whole population of households (male and female-headed) FGT0 for poverty accounts for 60,6% (TCPL-FGT0). For extreme poverty the value is at 21,9% (FOPL-FGT0). Male-headed households are poorer 61,6% (TCPL-FGT0) than female-headed households with 58,9% (TCPL-FGT0). This applies also to the extreme poverty with 23,1% for men and 19,8% for women (FOPL-FGT0) and to the other index (FGT1 and FGT2) which are for women about 2 percentage points lower than for men.

These figures suggest that male-headed households are on average poorer than women. However, the lower expenditures per head for male-headed households can result from bigger household sizes of male headed households. Thus, it results in an on average in higher poverty for male-headed households with many family members.

Nevertheless, female-headed households from widowed, divorced or never married women might face more difficulties and hardships than the households with the male as head with comparable situation (ZIMSTAT 2019b). Thus, the aggregated data might need to be interpreted carefully. The Gini index computed by ZIMSTAT (2019b) for the year 2017 accounts for 43,5%.

Table A1: Indices to measure poverty and inequality published by ZIMSTAT (2019b) for the base year 2017

		Whole Population	**Male-headed**	**Female-headed**
		2017	**2017**	**2017**
GINI		43,5		
TCPL	FGT0	60,6	61,6	58,9
TCPL	FGT1	26,9	27,8	25,4
TCPL	FGT2	14,7	15,3	13,6
FOPL	FGT0	21,9	23,1	19,8
FOPL	FGT1	NA	NA	NA
FOPL	FGT2	NA	NA	NA

Source: Simulation results.

Notes: ZimStat2019 = indicators provided by ZIMSTAT (2019b) for the year 2017, Base = indicators computed for the year 2017 as base for the simulated year 2021 and 2025, MILD-COVID = Scenario assuming mild impacts and fast recovery shock from COVID-19, SEVE-COVID = Scenario assuming severe impacts and longer lasting recovery shock from COVID-19, MILD-MITIG = Scenario MILD-COVID with mitigation measures, SEVE-MITIG = Scenario SEVE-COVID with mitigation measures, MILD-RECOV = MILD-MITIG with recovery measures, SEVE-RECOV = SEVE-MITIG with recovery measures.