

# HASHEMITE KINGDOM OF JORDAN: COVID-19 IMPACT

## Jordan COVID-19 Impact: CGE and Micro-simulation analysis 2020

A Fiscal Public Expenditure Review (FPER) report is being produced for the Hashemite Kingdom of Jordan. The work is led by Saadia Refaat (Task Team Leader and Senior Economist, Macroeconomics, Trade and Investment Global Practice) under the direction of Eric Le Borgne (Practice Manager, Macroeconomics, Trade and Investment Global Practice), Saroj Kumar Jha (Country Director, Middle East and North Africa Region) and Nadir Mohammed (Regional Director, Middle East and North Africa Region).

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The paper is based on SUT/IO table covering 23 sectors for 2010, Household Expenditure and Income Survey for 2017-2018 provided by the Ministry of Planning and International Cooperation, data from the UN COMTRADE database for 2016 and data on tourism from the 2016 Tourism Satellite Accounts produced by USAID. The team also benefited from several publicly available sources of data from the Government of Jordan, and the World Bank Group.

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## Summary

**The COVID-19 pandemic is impacting Jordan's economy through an unprecedented mix of lockdown and trade shocks. This paper seeks to forecast the impact of both shocks on the economy and household welfare of Jordan.** We adopt a Computable General Equilibrium (CGE) model of the Jordanian economy. The rich theory-based CGE model allows us to produce forecasts from 2020 to 2024 for key macroeconomic variables and simulate the effects of policy measures. More specifically, we specified two scenarios – likely and severe – to fully capture the outlook risk in Jordan. A dynamic Micro-Simulation (MS) along with the CGE model is simultaneously prepared and calibrated to estimate the impact on household welfare.

**Jordan's economy even before the COVID-19 shock was expected to remain on a low growth trajectory – however permanent losses from the shock could carry over the medium-term.** Jordan is facing significant multifaceted socio-economic challenges in the aftermath of the COVID-19 pandemic. These challenges are further amplified by the fact that the country is already moving along a low growth trajectory amid high youth unemployment rates for the last decade even prior to the shock as a result of due to deep-rooted structural weaknesses.

**In the likely scenario, we forecast that Jordan will experience a V-shaped economic recession along with a relatively quick recovery of global trade, Jordan's economy is projected to decline by 6.2 percent in 2020, when considering current mitigation policies.** These mitigation policies include adjustments in the public sector wages (nominal), reduction in the private sector formal wages (as per the defence law(s)), as well as some flexibility in the current account deficit (to be higher by 1bn JD). The current measures play a critical role in ensuring economic activity is better placed to recover when lockdown measures were lifted, around one-third of employment loss is saved due to these mitigation measures compared to counterfactual. However, the global trade downturn is a long-standing concern as it is expected to lead to around 80 percent of the Jordanian 2020 recession. The persistently weak external demand also results in drastically lower inflation expectations – the GDP deflator is forecasted to decrease by 23.9 percent. Going further, the path of the pandemic remains uncertain, in cases which the risk of a second wave of COVID-19 materialized, the economy will experience a deeper downturn and slower recovery than in the likely scenario.

**The initial shock is expected to increase the poverty rate in Jordan by 11 percent and more than double the poverty gap, as forecasted by the MS model.** Informal workers lack basic protections and financial resources to buffer temporary income losses during the lockdown period, making them more likely to be pushed into poverty. The crisis unevenly affected poverty in different governorates - Zarqa, Amman and Aqaba (Aqaba had the highest poverty rate pre-COVID-19) are expected to suffer the greatest impact. The poverty will gradually decline as sectors reopen but will not climb back to baseline level until end-2021. Nonetheless, real household consumption falls by less than income due to the expected lower prices for necessities. Combined with government emergency cash transfer and continued expansion of the social safety net, nearly half of the negative impact on poverty could be contained within the first two months.

**As COVID-19 economic shock is far wider and deeper, further policy measures can be deployed to limit economic impact.** For example, effective deployment of tourism bubbles (which allow portions of the international tourism to return quickly), further flexibility in the current account side, and additional targeted government spending of JD161 million on the bottom thirty percent households, can help restrict decline in GDP decline to 4.0 percent in 2020 under the likely case. However, the associated costs of reaching this goal are considerably larger and require longer-term financing to prevent these early gains being reversed by a delayed current account crisis.

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## Acronyms and Abbreviations

BoP	Balance of Payments
CBJ	Central Bank of Jordan
CGE	Computable General Equilibrium
CPI	Consumer Prices Index
CRS	Congressional Research Service
DOS	Department of Statistics
DPF	Development Policy Financing
GCC	Gulf Cooperation Council
GDP	Gross Domestic Product
GoJ	Government of Jordan
GTAP	Global Trade Analysis Project
HEIS	Household Expenditure and Income Survey
HIP	Health Insurance Program
ILO	International Labour Organization
IMF	International Monetary Fund
IO	Input-Output
JD	Jordanian Dinar
JEM	Jordan Economic Monitor
MENA	Middle East and North Africa
MS	Micro-Simulation model
NA	National Account
NAF	National Aid Fund
NPIs	Non-Pharmaceuticals Interventions
OECD	Organisation for Economic Co-operation and Development
P4R	Program-for-Results
Q2	Second Quarter
Q4	Fourth Quarter
RoW	Rest of the World
SAM	Social Accounting Matrix
SUT	Supply and Use Tables
TSA	Tourism Satellite Accounts
UAE	United Arab Emirates
UK	United Kingdom
UN	United Nations
UN	United Nations International Trade
COMTRADE	Statistics Database
US\$	United States Dollar
US	United States of America
USAID	United States Agency for International Development
WB	World Bank
WHO	World Health Organization
WWI	World War I

# 1. Introduction

This paper seeks to forecast the impact of the 2020 COVID-19 pandemic-crisis on the economy and household welfare of Jordan.<sup>2</sup> We focus on the impact of domestic and global lockdown. To answer this question, we use a Computable General Equilibrium (CGE) model of the Jordanian economy specified for a *likely* and *severe* scenario for COVID-19 on Jordan to produce forecasts (2020-2024) for key macroeconomic variables. Simultaneously, a dynamic Micro-Simulation (SM) model is calibrated to the CGE model to analyse the impact on household welfare. We use both models to study various mitigation measures as the Government of Jordan (GoJ) has currently undertaken as well as potential further measures they can undertake to mitigate the impact of the shock.

The CGE model produces forecasts of GDP growth, sector wage rates and commodity prices which are inputs for the MS model. Although the CGE model is fairly standard for this type of exercise, it has also utilised surveys of tourism to quantify the impact of the sharp drop in global tourism on the economy of Jordan.<sup>3</sup> The CGE model is divided into 23 economic sectors which can elucidate a more disaggregated impact of the crisis across those sectors. Some sectors are likely to gain from the crisis while most others will not. As the CGE model relies on annual average estimates, the dynamics of the shock are better captured by our MS model which allows us to visualise the precise timings and impact of lockdown and expanded government transfers on household welfare month by month. Similar models tend to produce at most only quarterly outputs and underestimate the short-term impact on households.

The analysis focus on the economic costs of domestic lockdown and global downturn in Jordan. Wuhan in the province of Hubei, China was the first to lockdown, on January 23<sup>rd</sup>, 2020. Since then one-third of the global population has at some time been locked down (Economist, 2020; Demirgüç-Kunt et al; 2020). Europe experienced its first COVID-19 case in France on January 24<sup>th</sup>, 2020 and, with the US, quickly became the second global epicentre. The upsurge was slow and initially seemed confined to travellers returning from East Asia. COVID-19 started spreading rapidly in northern Italy from mid-February. This was significant as the outbreak by then had no known travel links to East Asia. COVID-19 had become a pandemic. This was formally acknowledged by the WHO on March 11<sup>st</sup>, 2020. By March 2020 almost all countries in Western Europe had experienced 1,000 cases and 100 deaths (Demirgüç-Kunt et al; 2020). By June 24<sup>th</sup>, 2020, the COVID-19 pandemic had become truly global with 1.15 million cases in Brazil, 461,000 in India, 161,000 in Saudi Arabia and 106,108 in South Africa.<sup>4</sup>

The initial concern of many policymakers was with threats to the capacity of local health systems. Public health policy sought to impose drastic social distancing measures (Non-Pharmaceutical Interventions, or NPIs) and to promote health practices (such as wearing face masks and washing hands more often) to reduce the transmission rate. This, it was hoped, would slow down the spread of the pandemic over time, avoid a rapid surge in healthcare demand and reduce final mortality. By the time, Zimbabwe went into lockdown on March 30<sup>th</sup>, 2020, lockdown was a global norm. On March 17<sup>th</sup>, 2020, the GoJ announced that a nationwide curfew (called here 'lockdown'). The curfew was widely regarded as one of the strictest in the world. Subsequent to the initial announcement the government limited number of sectors that were wholly or partially exempt. Jordan was returning to some semblance of normality as curfew was lifted on May 3<sup>rd</sup>, 2020.

This paper is organised as follows: section 2 reviews the contemporary economic impact of the COVID-19 crisis, section 3 briefly examines the existing literature on pandemics, section 4 introduces the CGE and MS models, section 5 presents the key results from the macro and micro models, section 6 presents potential mitigation measures and section 7 concludes.

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<sup>2</sup>According to the WHO an epidemic can be defined as 'A sudden increase in the number of cases of a disease beyond that which may normally be expected for a particular population in a given area'. A pandemic likewise is defined as 'An epidemic that has spread over several countries or continents, affecting a large number of people.'

<sup>3</sup> See section 4.6.

<sup>4</sup> Coronavirus update. Source: <https://www.worldometers.info/coronavirus/>, accessed 9<sup>th</sup> July 2020.

## 2. The Economic Impacts of the COVID-19 Crisis

COVID-19 is unusual because of its contagious potential. It is pioneering in the massive global policy response - the lockdown. The lockdown has created simultaneous negative supply and demand shocks. The economic impact of COVID-19 runs through the lockdown reducing the supply of commodities to manufacturers and disrupting supply chains linking intermediate goods and finished goods (the supply-side shock) and reduced employment and increased uncertainty (the demand-side shock). The complex network linking consumers, employees, firms, government and banks risks a sudden disruption triggering a chain of negative and escalating economic shocks (Gourinchas, 2020).

The speed of the initial economic decline has been dramatic. In early 2020 the OECD had forecast global economic growth for the year of around 2.5 percent (OECD, 2020). By April 2020, the Congressional Research Service (CRS) (2020) was estimating that lockdown was reducing global GDP by 2.0 percent a month, an annualised equivalent of 24.0 percent. In June 2020, the OECD revised its forecast for 2020 to a global contraction of 7.6 percent, heralding some revival later in the year, but still the worst performance since the Great Depression. OECD countries with large (100,000+) cases of COVID-19 are forecast to suffer significant declines in GDP growth in 2020. For example, GDP in France is projected to contract by 11.4 percent, the UK by 11.5 percent and the US by 7.3 percent. The drop did not spare even those countries who implemented containment measures early and suffered few COVID-19 cases, i.e. Japan -6.0 percent and New Zealand -8.9 percent (OECD, 2020). These declines are mirrored across the developing world, in India (-4.5 percent), Brazil (-9.1 percent), Mexico (-10.5 percent), Saudi Arabia (-6.8 percent), Nigeria (-5.4 percent) and South Africa (-8.0 percent) (IMF, 2020). All these forecasts are contingent on the assumption that the early 2020 COVID-19 wave would be the only one. If, as many argue, there is a second wave, then all these projections are revised sharply downwards (OECD, 2020). There is general agreement that without a second wave there will be a rapid recovery of GDP growth. In 2021, for emerging market and developing economies GDP growth of 5.9 percent is forecast, led by China (8.2 percent). Global trade is forecast to follow the same pattern, to decline by 11.9 percent in 2020 and grow by 8.0 percent in 2021 (IMF, 2020).

The economic decline is forecast to be mirrored in rising unemployment. Measured unemployment rates in OECD countries are forecast to rise rapidly, to 9.2 percent across the OECD by the end of 2020. Rates are forecast to rise to 19.2 percent in Spain and almost 11.3 percent in the US.<sup>5</sup> Little recovery is predicted into 2021 (OECD, 2020). More difficult to measure is how employment is affected in developing countries, where informal sector employment predominates. The ILO estimates that 80 percent of the 2 billion informally employed workers will be significantly affected and that the decline in work hours in the second quarter of 2020 will be equivalent to more than 300 million full-time jobs (IMF, 2020).

The IMF (2020) found the country-differences in GDP declines to be strongly related to economic structure. Those sectors with complicated and truly global supply chains, such as automobiles, textiles and electronics are likely to have experienced the sharpest hit. Most important for Jordan have been the significant impacts on long-distance travel and transport. Lufthansa reduced 90 percent of its long-range flights and by the end of April had cancelled more than 23,000 global flights. The decline in tourism is likely to have a severe impact on Jordan. Jordan relies on tourism for more than 6.0 percent of its GDP (USASID, 2016). In some sectors Jordan is likely to gain from the crisis. While falling oil prices have reduced export revenue for the nine Middle East and North Africa (MENA) oil exporters, Jordan as a net importer of oil gains from this. For the MENA region, there were risks from disruptions in the Chinese-led supply chain for pharmaceutical production leading to shortages. With substantial domestic capacity in pharmaceutical production, this has benefited Jordan (Fernandes, 2020).

The economy too faces a 'flatten the curve' problem as governments seek to mitigate the economic costs of the COVID-19 crisis (Gourinchas, 2020). This has led to a massive policy response. The IMF have estimated that government spending and tax measures adopted in the months to mid-April 2020 amounted to US\$3.3 trillion. Other loans, equity injections and guarantees totaled an additional US\$4.5 trillion (CRS, 2020). Policy interventions have sought to ensure workers at home can continue to collect salaries, to

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<sup>5</sup> OECD.Stat. [https://stats.oecd.org/viewhtml.aspx?datasetcode=EO\\_EDITIONS&lang=en](https://stats.oecd.org/viewhtml.aspx?datasetcode=EO_EDITIONS&lang=en), accessed 16<sup>th</sup> July 2020.

prevent mass bankruptcy of firms and to support the financial system from mounting non-performing loans. Developing countries face additional challenges. Protecting workers at home will be harder when 50-90 percent of the population work in the informal sector and for daily cash wages and daily purchases of basic necessities. Developing countries also have lower governance capacity, debt subject to exchange rate risk and less capacity to expand borrowing (Loayza and Pennings, 2020). Fiscal deficits are projected to increase to 16.6 percent of GDP in developed countries, 10.6 percent in emerging market economies and 6.1 percent in low-income economies (IMF, 2020). Emerging market economies have injected an average of 5.0 percent of GDP as a ‘fiscal response’ to COVID-19 while this has only been 1.2 percent of GDP in low-income countries (IMF, 2020).

### **3. A Tale of Three Pandemics: A Literature Review of Spanish Flu, SARS and Ebola**

#### **3.1 From the Economics of General Health to the Economics of Pandemics**

There is a large literature looking at the interaction of health and the economy that demonstrates a robust causal link from poor health conditions to negative economic outcomes (Sachs, 2001). We cannot apply this standard literature to the case of pandemics. When infectious diseases of epidemic proportions are highly contagious and for which there are no vaccines, we need a specific ‘economics of pandemics’ (Bloom and Canning, 2006; Correia et al, 2020; Eichenbaum et al, 2020). Pandemics are likely to spread and persist for longer under conditions associated with poverty; overcrowded and insanitary conditions; malnourished people; and poor health infrastructure (Bloom and Canning, 2006). High incomes may help protect people but greater mobility via business and tourist travel may increase the exposure of the rich to contagion (Bloom and Canning, 2006). Specific economics of pandemics also needs to consider both the supply and demand side impact of an outbreak. On the supply side, a pandemic reduces the labour supply through increased mortality, morbidity and any efforts at state-sanctioned or self-imposed isolation. Restrictions on education may reduce human capital accumulation that reduces the future supply of skilled labour. The closure of industrial or agricultural sectors producing inputs for other sectors, such as raw cotton from agriculture for the textiles industry, or restrictions on the transport sector reducing the economic capacity to transport inputs and final outputs, are also important supply-side constraints (Correia et al, 2020). Declining incomes, reduced employment prospects and increased uncertainty associated with a pandemic will depress demand, especially for non-essential consumption and among potential tourists (Bloom and Canning, 2006).

There is a rapidly growing contemporary (and pre-COVID-19) literature exploring the efficacy of NPIs (called here ‘lockdowns’) in impeding variously the ‘temporal effect of a pandemic; reducing the overall and peak attack rate; and reducing the number of cumulative deaths’ (Markel et al, 2007). Lockdowns proved effective against the 1918 Spanish Flu across some US cities (Markel et al 2007; Garrett, 2008; Velde 2020). Using detailed data on the timing of lockdowns in the US, Correia et al (2020) find that early and extensive lockdowns were associated with no contemporaneous loss of income and even a relative increase in manufacturing employment, manufacturing output and bank assets in 1919 after the end of the pandemic. The effects are economically sizable. Reacting 10 days earlier to the arrival of the pandemic in a given city increased manufacturing employment by around 5.0 percent in the post-crisis period. In April 2009, Mexico was praised when their President invoked his constitutional emergency health powers to lockdown the country in response to the spread of the H1N1 influenza strain. This lockdown has long been praised as an example of swift, transparent and effective action to mitigate the spread of influenza (Stern and Markel, 2009). The empirical importance of lockdowns is now standard in models forecasting the spread of pandemics, such as SARS in Canada (Gupta et al, 2005) and COVID-19 in the US (Eichenbaum et al, 2020). The results show that lockdowns can protect the health system and reduce mortality but do impact on the economy.

## 3.2 Impact of Pandemics on GDP Growth

Using two sources, Velde (2020) finds little impact on GDP of the Spanish Flu at the more disaggregated level of US states. Brainerd and Siegler (2002) find that controlling for numerous factors there was a large and robust positive effect of the influenza epidemic on per capita income growth during the 1920s. This indicates that influenza caused a short-sharp V-shaped recession and those states suffering a greater initial economic shock then enjoyed a sustained period of catch-up economic growth. WWI ended in November 1918 (during the Spanish Flu) and Barro et al (2020) try to tease out the separate impact of warfare and influenza. They examine variations in the intensity of influenza and war intensity (ratio of military combat deaths to total population) across 42 countries. They find the Spanish Flu led to a decline in real per capita GDP of 6.2 percent in the typical country and WWI reduced GDP per capita in the typical country by 8.4 percent. World Bank (2015a) find that Ebola was associated with a sharp decline in GDP growth rates in Guinea, Liberia and Sierra Leone, although not a recession when considering annual data. Estimates of the GDP losses from SARS were US\$18 billion for the whole of Asia, or 0.6 percent of the region's total GDP (Grace and Warner, 2006). GDP growth in China had been accelerating in the early months of 2003, slowed down during the SARS crisis, but still finished for 2003 at 10.5 percent, compared to 10.2 percent in 2002 (Keogh-Brown and Smith, 2008; Buetels et al, 2009).

## 3.3 Impact of Pandemics on Economic Sub-sectors

In general, the evidence by economic sector supports the big conclusion from GDP data, that pandemic recessions are V-shaped, with a short and sharp decline followed by an equally rapid revival. However, there are very different stories by sector around this general pattern. Velde (2020) is able to use high-frequency, even weekly time-series data, to estimate the short-run impact of the Spanish Flu in the US. The production of automobiles declined during late 1918 and rebounded from January 1919. In retail, early mail order firms experienced higher sale volumes during the autumn crisis, while ordinary retail suffered but rebounded quickly in early 1919. Employment figures declined after a peak in summer 1918, then recovered to reach previous highs by December 1919. In all cases, the temporary influenza recession and quick recovery were swamped by the much larger, non-influenza recession that set in during 1920-21. During SARS in Hong Kong, there were sharp declines in sales by restaurants and retail outlets in March and they were back to normal by April (Overby et al, 2004). In China, there was a sharp drop in 'leisure consumption' in bars, restaurants, and in local and international transport in early 2003 and a rapid recovery in summer 2003 (Buetels et al, 2009). Ebola was found to disrupt the mobilisation of labour for the rice harvest in Liberia (de la Fuente et al, 2019) and Guinea (World Bank, 2015a) but agriculture made a rapid recovery in Sierra Leone (World Bank, 2015b; Glennerster et al, 2014).

# 4. A Computable General Equilibrium (CGE) and a Micro-simulation (MS) Model to Analyse the COVID-19 Economic Shock in Jordan

## 4.1 From Partial to General Equilibrium

In this paper, we use a CGE model to forecast the impact of the COVID-19 domestic lockdown and global trade shock on Jordan (see Box 1). We divide the economy into the 23 sectors used by the Jordanian government to construct its national accounts; the employed labour force is likewise divided into 23 equivalent types of labour.<sup>6</sup> Many of the studies we have reviewed in this paper (see Fernandes, 2020), for example, use a partial equilibrium analysis. They rightly conclude that the COVID-19 shock will have a negative impact on tourism, or education or manufacturing. They are only concerned with the partial equilibrium impacts of the COVID-19 shock and miss the indirect impacts. We account for the indirect

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<sup>6</sup> Agriculture, forestry and fishing; Mining and quarrying; Food, beverages and tobacco; Textile, garments, and leather; Wood, furniture, paper and printing; Coke and petroleum; Chemicals, pharmaceuticals, rubber and plastic; Non-metallic minerals; Other manufacturing; Electricity, gas, steam and air conditioning supply; Water supply; sewerage, waste management and remediation activities; Construction; Wholesale and retail trade; repair of motor vehicles and motorcycles; Transportation and storage; Accommodation and food service activities; Information and communication; Financial and insurance activities; Real estate activities; Professional, scientific and technical activities; Public administration and defence; compulsory social security; Education; Human health and social work activities; Other service activities.

effects as well in our general equilibrium approach.<sup>7</sup> The scale of these economic inter-relationships is evident in the fact that our model includes 5,035 equations and 6,304 variables. For instance, the loss of manufacturing employment in Jordan will reduce disposable incomes which in turn reduce consumer demand and so the incentive of firms to invest in new retail capacity, which in turn impacts on the construction sector.

### Box 1 The CGE Model of Jordan

An aggregate social accounting matrix (SAM) for the main macroeconomic accounts for Jordan 2016 was constructed. The SAM portrays the circular flow of income: from activities and commodities, to factors of production, to institutions, and back again to activities and commodities. The activity, commodity, and factor accounts all include the specification of market behavior: supply; demand; and clearing conditions. The household and government accounts embody the budget constraints of private households and the public sector budget – that is, income equals expenditure. The capital and the rest of the world accounts represent the macro-economic requirements for internal balance; savings equal investment; and external balance, exports plus net-capital inflows equal imports.

For the *households*, 10 representative consumers separated by income deciles are assumed to allocate their disposable income optimally among goods and services, leisure and savings. The income is defined as after-tax return on capital endowment, government and external transfers, and after-tax return on labor endowment.

The standard CGE model does not incorporate explicit *investment* behavior by firms, either at the sectoral or aggregate level. In each period, the total level of savings available for investment is defined as the sum of household savings, the government sector's operational balance and the net inflow of foreign capital given by the difference between total imports and total exports less net official and non-official transfer payments. If the model is run in a dynamic mode, total investment is added to an estimate of the existing stock of capital net of depreciation.<sup>8</sup> The institutional ownership of the additional capital stock is allocated according to each institution's share in total savings.

The *government* sector has two principal functions, the collection of revenues and the determination of the level and pattern of public expenditures, including government consumption, subsidies and net asset financing. Revenues are derived from taxes and /or profit shares on factor incomes. The incentive effects of the tax and subsidy regime are reflected through their influence on the decisions of economic agents by changing relative prices and disposable incomes. The level of tax revenues is endogenous in the model as it depends on the resulting (equilibrium) level of economic activity.

Two sets of *factor markets* must be in *equilibrium*: capital and labor. Capital is imperfectly mobile between competing uses established by a transformation function between capital uses. The capital market is in equilibrium when the value of the marginal product of capital is equalized between all sectors. Labor is split between formal and informal labor. Only formal labor pays income taxes. Similarly, to capital the total labour force is assumed to be imperfectly mobile between sectors and employment status. Labor demand is based on firm cost minimisation with diminishing returns to scale and employment and wages determined by the intersection of labor supply and demand. Unemployment is the difference between the labor force and employment.

<sup>7</sup> Indirect effects are defined as the subsequent impact of the shocks on one sector to another. For example, the tourism shock reduces the demand for hotels and restaurants services, which in turn reduces the demand for food and beverages products. This will reduce the demand for agricultural products, etc. The general equilibrium is established when prices adjust in all markets to ensure that demand equal supply.

<sup>8</sup> To calculate the initial capital stock in each sector, we assume that the rate of return on any type of assets is the same in all occupations. Second, this return is assumed equal 7.5 percent, which is a weighted average of interest rates in Jordan in 2016. This is assumed to be equal to the average nominal long-term interest rate in Jordan. These two assumptions give the total stock of capital in the economy, which is then allocated to each of the institutions according to its share of capital factor payments in the SAM for 2016. The portfolio choices of each type of capital for the capital owners are given as a revenue maximisation problem. Similarly, the split of labour into each occupation and formality is given as a revenue maximisation problem.

The model has more variables than equations, in order to solve the model, we need to treat some of those variables as ‘exogenous’. In CGE parlance this is known as ‘closing the model’. The exogenous variables can be chosen in a number of different ways, to reflect assumptions about how the economy works or as a product of the research question or to enable us to better focus on particular aspects of the economy. In our baseline scenario, the exogenous variables in our model are set according to the World Bank Spring 2019 forecasts for Jordan. These variables include the real level of public consumption, indirect tax rates, direct tax rates, the current account balance, and all transfers between domestic institutions and transfers (including factor incomes) between domestic institutions and the rest of the world. While the nominal exchange rate is fixed, the real exchange rate remains endogenous, as domestic price levels are determined within the CGE model. In the crisis scenarios, we assume a 10 percent decline in international remittances to Jordan and that the highest household per capita consumption decile increases their savings by 60 percent as a precautionary measure.<sup>9</sup> In section 6 we produce results based on the GoJ current mitigation scenario and follow this up by running a series of forecasts for various ‘mitigation’ scenarios. In these mitigation scenarios, we examine the impact of altering various of these exogenous variables.

## 4.2 From the Macro to the Micro Analysis

The second model we use is a MS model. This model seeks to capture the impact of COVID-19 at the level of the household. Household income will be affected as workers lose employment or miss workdays through sickness or from taking care of sick family members. Remittances from families working elsewhere in Jordan or overseas may decline if those relatives experience reduced employment opportunities (although they could also increase through a benevolence motive). The likely impact of government transfers is ambiguous; pensions or social protection payments may decline if the government is under greater fiscal pressure or increase if the government actively seeks to alleviate pandemic-induced hardship. In a later section we use the CGE and MS models to examine the impact of changes in government transfer payments. Households may also be burdened by extra medical costs or higher food prices if domestic and global supply chains are impacted or prices surge because of panic-bulk-buying of essentials. The MS model examines the short-term impact of COVID-19 on Jordanian households and beyond. The model focuses on: i) household labour earnings; ii) domestic and international remittances; iii) changes in public transfers; and iv) changes in the cost of living. The MS model utilises the macroeconomic results produced by the CGE model and simulates the impact of the COVID-19 shock on individual households. We discuss the MS model methodology in more detail in section 4.7 and the potential short- and longer-term impacts on household-individual welfare in section 5.2.

## 4.3 Data Sources for the Two Models

We rely on official GoJ sources for much of the data. The CGE and MS models both use the Household Expenditure and Income Survey (HEIS) for 2017-2018.<sup>10</sup> We draw on some international data sources, in particular, external trade data are taken from the UN COMTRADE database for 2016 and data on tourism from the 2016 Tourism Satellite Accounts (TSA) produced by USAID.<sup>11</sup> A SAM for Jordan was compiled to and balanced for 2016. In Table 1 we show a schematic SAM with Supply and Use/Input-Output (SUT/IO) table information coloured red and the redistributive accounts coloured green.

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<sup>9</sup> This approximation for Jordan is drawn from the fact that such shifts in savings have been found in other contexts (BEA, 2020).

<sup>10</sup> The HEIS is a household budget survey which collects data on household and individual demographics, education, employment status, assets and income. The 2017-18 survey utilised a two-stage stratified sample design carried out across about 20,000 households by 180 trained fieldworkers. The data have been collected in Jordan since 1966. The survey we used for our study (2017-18) was improved through a collaboration between the World Bank, Sistemas Integrales and the Jordan Department of Statistics (DoS), which sought to improve the survey design to deliver more accurate and timely data. The questionnaire also incorporated questions to cover Syrian migrants and other non-Jordanians.

<sup>11</sup> The TSA 2016 was conducted with USAID assistance in collaboration with the Jordanian Ministry of Tourism and Antiquities. Using a mix of industry and consumer surveys the TSA seeks to measure the volume and allocation of tourist consumption across economic sectors and produce estimates of tourist-created economic impacts (6 percent of GDP and 88,506 jobs in 2016).

**Table 1 Schematic SAM**

	Activities	Commodities	Factors	Tax Revenue	Households	Government	RoW	Savings/ Investment
Activities		Output						
Commodities	Intermediate demand			Subsidies	Household consumption	Government consumption	Exports	Gross capital formation
Factors	Factors demand							
Tax Revenue		Indirect taxes	Direct taxes					
Households			Net factor payments			Government transfers	Private transfers and incomes, net Public transfers and incomes, net	
Government			Net factor payments	Tax revenue	Fees and fines			
RoW		Imports	Net factor payments					
Savings/ Investment					Household savings	Government savings	RoW savings	

IO tables account

Redistribution accounts

We used SUT/IO table covering 23 sectors for 2010 (red area). The SUT/IO sector structure of 2010 was applied to the sector value added structure of the 2016 national accounts (NA). Household consumption demand (red area) and after-tax factor incomes and transfers (green area) were disaggregated using expenditure and income shares from the HEIS 2017. Capital formation structure (red area) is given from the SUT/IO table 2010. Export and import commodity trade data (red area) compiled from UN COMTRADE accounts were applied. The service trade travel component was separated into NA commodity groups using the USAID TSA 2016. External transfers (green area) were taken from the Balance of Payments (BoP) reports. The government accounts were generated from Central Government budget information (government consumption (red area) and taxes and transfers (green area)). The application of fixed expenditure and input shares from HEIS 2017 and IO/SUT 2010 gives an initial SAM estimate that is unbalanced, and balancing was done using a bidirectional entropy method constrained by observed levels.

#### 4.4 Three Forecasts from the CGE

The CGE model runs three forecasts. The first of these is the ‘Baseline’, which uses the World Bank Spring 2019 forecasts for the Jordanian economy to forecast what would have happened in the absence of the COVID-19 shock. We estimate a ‘likely’ scenario in which Jordan imposes a lockdown of six weeks to deal with a single wave. This effort is also reflective of a single-wave global scenario, so international trade and tourism recover quickly. The ‘severe’ scenario sees a second COVID-19 wave that requires Jordan to impose a second curfew-lockdown in the fall of 2020 – implying a slow recovery in global trade and tourism.<sup>12</sup>

#### 4.5 COVID-19 in Jordan: The Duration and Severity of the Lockdown

The curfew was announced in Jordan on the March 21<sup>st</sup> to begin the next day and ended on May 3<sup>rd</sup>. This paper attempts to model the impact of the lockdown shock. Economic sectors in Jordan were wholly, partially or not exempt from the lockdown based on various principles. Some sectors are more capital-

<sup>12</sup> All these scenarios are unmitigated; that is, they model what would happen in the absence of policy interventions. In the CGE model, formal employment, informal wages and return on capital bear the brunt of the real depreciation required to ensure a return to domestic and external equilibrium.

intensive than others, so could continue to produce relatively safely even during the crisis. e.g. electricity, coke and petroleum. Some sectors are of low economic and social priority, i.e. wood, furniture and paper where the lockdown could be more strictly implemented. Service sectors such as education, construction and restaurants, which bring large groups of people together, were also subject to strict lockdown. The impact of the lockdown represents a supply-side (or productivity) shock; workers and firms were no longer able to produce output, resulting in a reduction in aggregate supply in the Jordanian economy.

The lockdown shock is divided into two dimensions, the duration and the severity. The duration is simply the number of months that the sector was closed, either partially or fully. The estimates of duration were drawn from government policy announcements and media reports in Jordan. Table 2 below aggregates the 23 sectors into 5 broad groupings: agriculture and food, other industry, transportation, hotels and restaurants and other services (see Appendix A for detail specifications by sector). For each sector the average severity (the proportion of their existing capital stock which could not be used to produce output) is shown, ranging from 60.0 percent in hotels and restaurants to 9.0 percent in agriculture and food. We estimate that 19.8 percent of Jordan’s capital stock was locked down in March 2020. The estimated duration for each grouping is also shown, ranging in the likely scenario from 0.5 months for other services to 2.5 months for hotels and restaurants. As noted above, in the severe scenario the duration is doubled by a second wave lockdown in autumn 2020.

**Table 2 The Lockdown: Severity and Duration**

		<b>Agriculture and Food</b>	<b>Other Industry</b>	<b>Transportation</b>	<b>Hotels and Restaurants</b>	<b>Other Services</b>	<b>Total</b>
		% of Operating Surplus					
<b>Severity</b>	<i>March</i>	-9	-28	-50	-60	-9	-19.8
		Months					
<b>Scenario</b>	<i>Duration</i>	0.7	0.9	1.5	2.5	0.5	0.7
Severe	<i>Duration</i>	1.4	1.8	3.0	5.0	1.0	1.5

The CGE model looks at annual data and produces a single data point for each year. This means we need to produce an annual average for the combination of the duration and severity of the lockdown in order to estimate its economic impact. For example, the education sector was assumed to be 95 percent closed for 3 months ( $0.95 \times 3/12$ ), or a loss of 26 percent of its output during 2020. As we discuss below, the MS model tells us much more about the timing and pattern of the impact of the lockdown.

One concern may be the reliance on official statements and policy announcements as the best available information to estimate the duration and severity of the lockdown at the time of the analysis. In many developing countries a large informal economy or black market means that actual economic activity can diverge significantly from officially recorded economic activity. In Jordan there is good reason to believe that the actual experience of economic lockdown was near identical to that announced by the government. There was widespread support for the lockdown, it was rigorously enforced and there were no or very few reports of informal street-markets emerging after restrictions were announced on formal retail trade.

#### **4.6 The Export Shock**

The global export shock represents the sum total of all COVID-19 related restrictions that hinder firms in Jordan from exporting. This represents a negative shock to aggregate demand in Jordan as there is less demand from the global economy for Jordanian exports (See Appendix A for detail trade shock specifications by sector). The shock includes some domestic factors such the closure of international borders and airports for most types of travel and trade, as well as global factors such as declining incomes among other countries in the world reducing demand for Jordanian exports or a ‘fear factor’ reducing the motivation of tourists to travel overseas for a holiday. The export shock is treated here as a binding quantitative restriction, so falling prices of exports will not increase quantity.

We incorporate the impact of the decline in world trade generated through a multi-region, multisector, economy-wide CGE model. The Global Trade Analysis Project (GTAP) model was developed for Jordan.<sup>13</sup> The model assumes both perfect competition and constant returns to scale. The baseline year was 2020, on top of which two assumptions about COVID-19 were imposed<sup>14</sup>: (i) a global trade reduction of around 13 percent with respect to the pre COVID-19 equilibrium (similar to the 2008 Global Financial Crisis); and (ii) global oil prices are halved with respect to their 2019 average. The GTAP model estimates an increase in Jordanian exports of oil and petroleum products, minerals and minerals products of around 90 compared to the baseline. In addition, major declines were estimated in imports of forestry, chemical, rubber, plastic, mineral products; electronic equipment; and transport services of around 30 percent from the baseline.

Tourism is of particular importance to Jordan, as it accounts for about one-third of Jordan’s exports. The duration we have assumed will vary according to the origins of the tourists. We align our assumptions here with a recent USAID (2020) tourism research project as shown in Table 3 below. 33 percent of tourists to Jordan are Jordanian nationals, mainly living in Saudi Arabia and UAE and who are likely to return relatively quickly as travel and quarantine restrictions are lifted (we assume 4 months). Arab and GCC tourists, many of which are unable to go on holiday to the US and Europe and are likely to return earlier as well (we assume within 6 months). Tourists in the rest of the world will be further delayed in travelling to Jordan on holiday (up to 12 months). For the Severe Scenario we assume a commensurately longer period for return, i.e. 6, 9 and 15 months for the three types of tourist on account of the second wave assumption. The severity is linked to the strictness of the original curfew-lockdown in Jordan and elsewhere. International trade in these sectors linked to the international movement of people will experience a very severe shock; professional and scientific services (such as international consultancy) and accommodation and food services (tourism) are both estimated to suffer a 90.0 percent restriction on exports. Overall tourism exports are estimated to decline by 49.5 percent, which is equivalent to a contraction in exports of 17.7 percent. Tourism imports are also forecasted to decline by 49.5 percent, leading to only a 0.8 percent decline in imports.

**Table 3 Trade Shock – WB Tourism Scenario Specification**

Tourist Origin	2019 Tourism Expenditure Share (%)	Duration of Travel Restrictions (months)	Likely Scenario			Severe Scenario			
			Annualised Change (%)			Annualised Change (%)			
			2020	2021	2022	2020	2021	2022	
<b>Jordanians Overseas</b>	33	4	-30.1	43.0	0.0	6	-53.0	112.6	0.0
<b>Arab and GCC</b>	40	6	-52.0	108.4	0.0	9	-71.5	250.9	0.0
<b>Other International</b>	27	12	-69.9	165.1	25.2	15	-69.9	91.3	73.6
<b>Total Tourism Export</b>	<b>100</b>	<b>-</b>	<b>-49.5</b>	<b>87.4</b>	<b>5.7</b>	<b>-</b>	<b>-64.9</b>	<b>153.0</b>	<b>12.7</b>

Note: Travel restrictions – 90% for the duration.

Source: 2019 Tourism expenditure share from USAID Tourism project.

## 4.7 The MS Model

The MS model (as with the CGE) first produces a counterfactual baseline estimate: what would have happened to household welfare without the COVID-19 shock. We then estimate the impact of COVID-19 by reducing household consumption through the loss of domestic and international remittances and labour income (see Box 2). We model households across the household per capita consumption distribution and utilise a range of assumptions. These include assumptions we share with the CGE model, such as the length of the lockdown by sector, the severity of economic shock and duration of recovery by sector and

<sup>13</sup> Detailed information about the model can be found at <https://www.gtap.agecon.purdue.edu/>. The data were updated for Jordan to 2020 by the World Bank project team.

<sup>14</sup> The Jordan GTAP CGE was originally developed for the “Opportunities for Jordanians and Syrian Refugees” P4R’s economic analysis. It was expanded to provide inputs to the Jordan Development Policy Loan on the share of external (trade) shock in comparison to internal (lockdown).

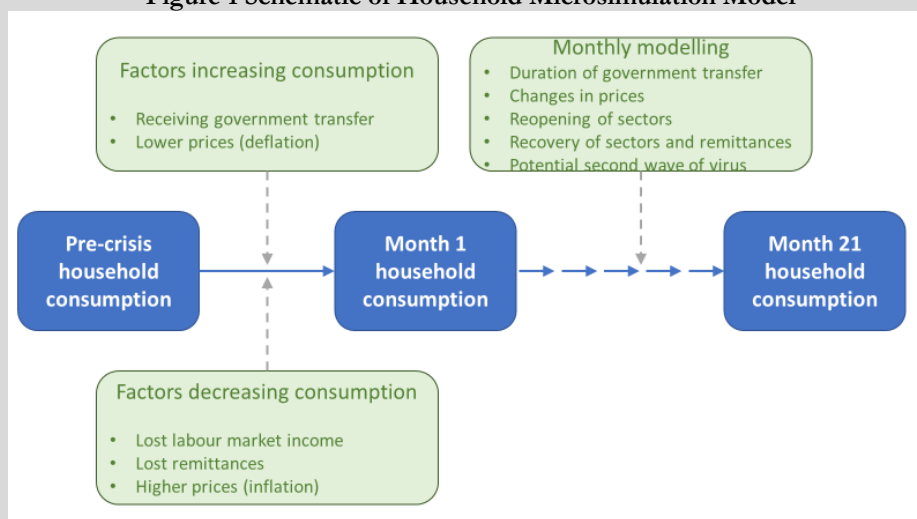
the loss of international remittances. There are also assumptions specific to the micro-simulation model, including the loss of wages as determined by the sector of employment and whether the worker is based in the formal or informal sector<sup>15</sup> and the loss of domestic remittances. Changes in the prices for goods and services are taken directly from the CGE model, while whether a household receives a government emergency transfer and its level and duration are modelled on the government response at the time of writing.

### Box 2 The MS Model of Jordan

The household microsimulation model is based on Jordan’s 2017-18 HEIS collected by the Department of Statistics (DoS). This survey contains detailed information about a household’s sources of labour and non-labour income as well as consumption across a comprehensive range of goods and services. The national poverty rate, 15.7 percent, is estimated from this survey based on the number of households with a monthly per capita total consumption below the national poverty line. Household consumption and the poverty rate are brought up to the beginning of 2020 as a pre COVID-19 baseline. This is done by increasing labour income by growth in GDP per capita since the survey was collected and adjusting the poverty line by CPI inflation. As a result, pre COVID-19 poverty is estimated at 15.0 percent.

The impacts of the crisis are then estimated by first decreasing consumption from the baseline through the loss of domestic and international remittances and labour income due to the lockdown and economic shock, which varies by the household’s sector of employment and whether they work informally. Consumption is then increased by temporary targeted cash transfers from the government as part of the official emergency response. Real consumption is also affected by changes in the cost of living due to inflation or deflation resulting from the crisis (which come from the CGE model for each scenario). Each of these channels can vary by month and household consumption is projected out monthly from the start of the crisis in March for 21 months to the end of 2021 (Figure 1). An important feature of this particular MS model is that the monthly modelling allows us to capture the time-series of V-shaped pandemic impacts (should this occur) or slower recovery. The immediate short-term immediate impact of the crisis and its subsequent evolution is shown, as well as the extent to which government transfers can mitigate these effects for the duration in which they are in effect. It also allows labour market incomes to recover differentially by sector as recovery happens at different speeds. Finally, the potential for a second wave and associated lockdown can be timed and incrementally increase poverty from the heightened levels due to the first wave.

Figure 1 Schematic of Household Microsimulation Model



<sup>15</sup> Empirical evidence from other contexts suggests that informal sector workers are more likely to lose employment and experience wage cuts in response to economic crises; informal workers are also not protected in practice by Jordan’s Defence Orders.

The impact of the crisis on poverty in the longer-term can be estimated as the difference between the final projected poverty at month 21 from the simulations and projected counterfactual if there had been no crisis. This counterfactual poverty rate is also based on projecting each household’s consumption into the future, but instead of consumption changing due to the effects of lockdown, economic recovery and government emergency responses, consumption changes due to increases in labour income based on counterfactual GDP growth. As with the crisis scenario, real consumption also changes with inflation. Both GDP growth and inflation counterfactuals are based on World Bank estimates prior to the crisis in Fall 2019.

These assumptions are summarised in Appendix B. The sectoral length of lockdown and recovery are the same as for the CGE model. The loss of wages in the formal private sector is based on government Defence Orders and mandate no dismissals and a maximum wage decrease of 30 percent in open sectors (which have been allowed to operate during the lockdown) and 50 percent in closed sectors. Such regulations, however, do not protect informal workers, so those in open sectors are assumed to lose 50 percent of their income (while they can work, it requires obtaining a permit and registering for social security, which will deter many) while those in closed sectors lose 100 percent (as they cannot work at all). Those working in agriculture and livestock see less impact as farming continues but are still affected by disruptions to mobility and transportation good, we can cross-reference to the result on agriculture from the CGE model here. Public sector wages are reduced by 10 percent in 2020 but restored with an additional 10 percent increase in 2021, International remittances are reduced by 15 percent based on a World Bank Jordan Economic Monitor - Spring 2020 (JEM Spring 2020<sup>16</sup>) estimate, while domestic remittances are reduced by 50 percent due to the lockdown and slow economic recovery (sector of employment for domestic remitters is not known), in line with results from the CGE model). Annual changes in prices come directly from the CGE model and are taken as an average across the calendar year. Temporary government transfers are based on the official response as of July 2020. The benefit levels depend upon the household composition and last for six months. Temporary beneficiaries are selected according to the official targeting criteria which are modelled using the survey data.

## 5. The Key Results

### 5.1 The Key Macroeconomic Results

This section first presents the forecasts from the CGE model for the baseline (Jordan without COVID-19), the next section the likely and severe scenarios, we then compare the impact of the domestic lockdown and the global trade shock, we then look at inflation (here ‘GDP deflator’), investment, and the sectoral impact of the COVID-19 shock.

#### 5.1.1 The Baseline: Jordan without the COVID-19 Crisis

Table 4 below shows the ‘baseline’ forecasts for Jordan. The general story was that Jordan from 2019 to 2022 would experience stable but slow economic growth, a low or even declining level of investment and moderate-stable inflation.

**Table 4 JEM Spring 2020 Forecasts for Jordan: The Baseline**

Economic Indicator	2019	2020	2021	2022
GDP Growth (%)	1.9	2.2	2.3	2.4
Investment (% of GDP)	9.7	10.5	9.9	9.7
Deflator at Market Prices (%)	1.9	1.8	2.1	2.1

Source: JEM, Spring 2020.

<sup>16</sup> Jordan Economic Monitor – Spring 2020: Weathering the Storm (English). Washington, D.C.: World Bank Group. <http://documents.worldbank.org/curated/en/895901594653936142/Jordan-Economic-Monitor-Spring-2020-Weathering-the-Storm>.

### 5.1.2 The COVID-19 Recession

Under the likely scenario, we forecast that Jordan will experience a V-shaped economic recession - a short and sharp decline in GDP in 2020 (8.4 percent), followed by a rapid recovery in 2021 (11.0 percent growth) (see Table 5). In 2022 Jordan will return to slightly below trend growth in 2022 (1.9 percent growth). The key drivers of the decline in 2020 are falling consumption (-7.8 percent), investment (-57.7 percent) and exports (-17.6 percent). Under the severe scenario, we forecast that Jordan will likewise experience a V-shaped pattern of economic growth, a decline in 2020 (-11.0 percent) and rapid recovery of growth in 2021 (12.9 percent) and continued recovery into 2022 (3.5 percent growth).

**Table 5 Annual GDP Growth in Jordan at Market Prices (%)**

Scenario	2019	2020	2021	2022
Likely	1.9	-8.4	11.0	1.9
Severe	1.9	-11.0	12.9	3.5

### 5.1.3 Lockdown or Global Trade: A Comparison

Table 6 shows that the lockdown (using the likely scenario) is forecast to reduce GDP growth in Jordan from an estimated 1.9 percent in 2020 to -0.8 percent in 2020, a decline of 2.7 percentage points. The global trade shock is forecast to reduce GDP growth from 1.9 percent to -7.8 percent, a decline of 9.7 percentage points. The comparison reveals that the impact of the global demand shock on GDP growth in Jordan is about four times greater than the impact of the domestic lockdown. Or, to put it another way, around 80 percent of the Jordanian 2020 recession will come from the global trade shock and only 20 percent from the lockdown. The GDP decline of -8.4 percent in 2020 combines both shocks.<sup>17</sup>

The relatively limited impact of the domestic lockdown can be explained by the fact that only a part of the Jordanian economy was locked down, and that for only a limited time period. We estimate that at the peak of the domestic lockdown 19.8 percent of the capital stock in Jordan could not be utilised by firms to produce output (the severity of the lockdown). Table 2 (as mentioned earlier) shows that much of the economy was locked down for less than one month (the duration of the lockdown). The relatively limited severity and short duration of the domestic lockdown was equivalent to only -2.2 percent of the capital stock being locked down on an annualised basis in the likely scenario (and 3.4 percent for the severe scenario).

**Table 6 GDP at Fixed Market Prices Growth (%)**

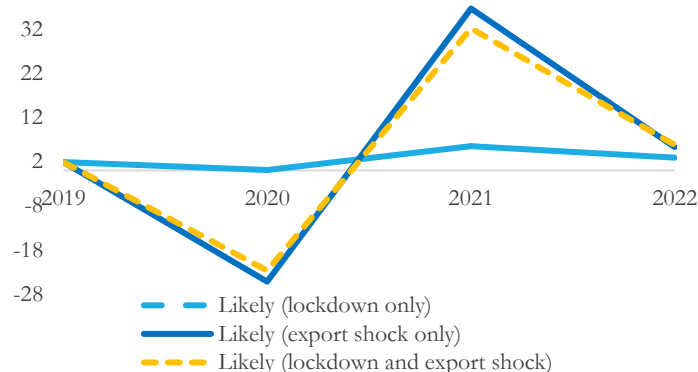
Scenario	2019	2020	2021	2022
Likely (lockdown only)	1.9	-0.8	3.9	1.4
Likely (export shock only)	1.9	-7.8	10.3	2.0
Likely (lockdown and export shock)	1.9	-8.4	11.0	1.9

### 5.1.4 Aggregate Demand and Aggregate Supply

As noted in section 4.5 (and shown in detail in Appendix A) the domestic lockdown is a supply-side shock which reduces aggregate supply in Jordan and theory suggests should result in a reduction in output and a rise in prices. Table 7 confirms this theoretical prediction and shows that the domestic lockdown alone is consistent with positive inflation (0.1 percent) in 2020. The global export shock represents a negative demand-side shock to Jordan which theory predicts should result in a fall in both output and prices. Table 7 confirms this theoretical prediction and shows that global trade shock is forecast to generate negative inflation (-25.2 percent). The combined impact of demand and supply is negative (-22.7 percent). The economic impact of COVID-19 in Jordan will be dominated by global trade shock.

<sup>17</sup> The numbers are not additive, for example, if the domestic lockdown closes tourist hotels then the international decline in tourism will have no additional impact.

**Figure 2 GDP at Market Prices Deflator (%)**



**Table 7 GDP at Market Prices Deflator (%)**

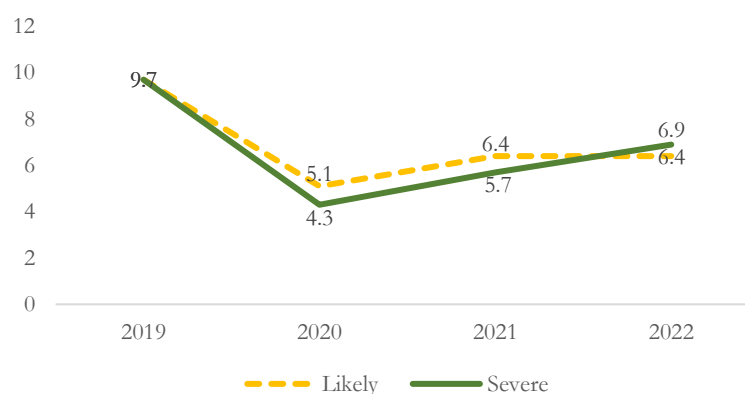
Scenario	2019	2020	2021	2022
Likely (lockdown only)	1.9	0.1	5.5	2.9
Likely (export shock only)	1.9	-25.2	36.7	5.3
Likely (lockdown and export shock)	1.9	-22.7	32.2	5.8

The aggregate price decline we forecast here is not uniform across all economic sectors in Jordan, rather prices tend to decline most in those sectors disproportionately represented in the consumption baskets of the poorest. The CGE model results show that the consumption deflator for the poorest decile of households will decline by 19 percent in 2020 and by only 15.8 percent for the richest decile of households. This will offset some of the negative welfare implications of the crisis for the poorest.

### 5.1.5 The Growth Revival and Sustained Economic Growth in Jordan

The 2020 crisis in Jordan hit an economy already forecast to be locked into a cycle of slow economic growth. Figure 3 demonstrates that investment as a share of GDP was low and declining even before the 2020 crisis. Investment is forecast to decline sharply under both the likely and severe scenarios, to only 5.1 and 4.3 percent of GDP respectively in 2020 and to remain significantly lower than pre-crisis levels into 2022. Importantly, investment (according to our model) from 2020 onwards will be insufficient to replace the existing capital stock, leading to the capital stock in Jordan actually declining. Growth accounting exercises carried out using the CGE model show that under both the likely and severe scenarios by 2023 investment will be making a negative -0.9 percent contribution to economic growth.

**Figure 3 Investment as Percent of GDP at Market Prices**



Other emerging constraints on economic growth are the current account and government budget deficits. In both the likely and severe scenarios, the current account worsens relative to 2020, from -3.0 to around -4.5 percent of GDP. In both scenarios only a slow improvement, to around -3.5 percent of GDP is forecast by 2022. In 2020 we forecast a government budget deficit of 8.6 and 9.6 percent in the likely and severe scenarios respectively owing principally to rising expenditure.<sup>18</sup> By 2022 we forecast sharp declines in both revenue and expenditure relative to 2020 but a continuing government deficit of 5.1 and 5.8 percent in the likely and severe scenarios respectively. This implies there is very little fiscal space to boost public investment or extend incentives to boost private investment. The deficit also crowds out private investment by commandeering a larger share of the available saving to the government sector.

### 5.1.6 Sectoral Impact of the Shock: Value Added and Employment

Jordan is forecast to have a mixed record in protecting basic necessity sectors during the crisis. Table 8 shows that agriculture and the food supply chain are expected to do well but sectors such as education will suffer a significant decline in output and employment.

**Table 8 Value Added and Employment Growth: Basic Necessities**  
(Employment growth in parentheses)

Sectors	Baseline	Likely	Severe
Agriculture, forestry and fishing	0.9 (0.0)	4.1 (-0.3)	3.3 (1.3)
Food Processing, beverages and tobacco	1.5 (0.4)	0.1 (-4.1)	-2.4 (-6.2)
Education	4.5 (2.1)	-11.9 (-11.6)	-14.8 (-13.6)

The results from the CGE model give concrete examples of sectors that are forecast to gain from the crisis, in output and less so employment terms. Table 9 shows that chemicals (some trade was allowed and there was increased demand for pharmaceutical and sanitation products); other manufacturing (benefiting from falling oil prices); and mining (a sector that has been physically quarantined in Jordan and continued production) all experienced more rapid growth of value added that had been anticipated under the baseline scenario. The forecast impact on employment is more mixed.

**Table 9 Value Added and Employment Growth: Sectors Gaining from Crisis**  
(Employment growth in parentheses)

Sectors	Baseline	Likely	Severe
Chemicals, pharmaceuticals, rubber and plastic products	0.2 (-0.8)	4.5 (0.0)	4.4 (0.5)
Other manufacturing	0.7 (-0.4)	2.1 (-2.5)	0.9 (-3.5)
Mining	1.2 (0.1)	4.7 (1.0)	22.0 (11.1)

Table 10 shows that there are a wide range of economic sectors that suffered a significant hit to value added and employment during the crisis in Jordan. These included construction and non-metallic minerals (both associated with investment activity); wholesale and retail trade (impacted by the closure of all but essential grocery and pharmaceutical shops); transport and accommodation and food services (hit by the decline in tourism); and professional and administrative services (impacted by the stay-at-home requirements of the lockdown).

**Table 10 Value Added and Employment Growth: Sectors Experiencing Significant Decline**  
(Employment growth in parentheses)

Sectors	Baseline	Likely	Severe
Transport	1.3 (0.1)	-8.8 (-11.9)	-14.8 (-16.4)
Wholesale and retail trade	1.9 (0.7)	-7.2 (-11.9)	-9.5 (-16.4)
Professional and administrative services	2.6 (0.7)	-17.8 (-19.9)	-23.0 (-24.3)
Accommodation and food services	1.8 (0.3)	-16.2 (-19.8)	-20.6 (-21.0)

<sup>18</sup> We have not explicitly modelled the impact of various government decisions to allow the private sector to postpone payment of sales and some other taxes that are due. We did include in the baseline an assumption to increase the effective (tax rate and tax collection effort) tax rates for both indirect and direct taxes.

Non-metallic minerals	3.3 (2.9)	-13.9 (-24.3)	-15.5 (-25.9)
Construction	6.4 (4.8)	-32.4 (-35.0)	-37.9 (-39.4)

### 5.1.7 Tourism

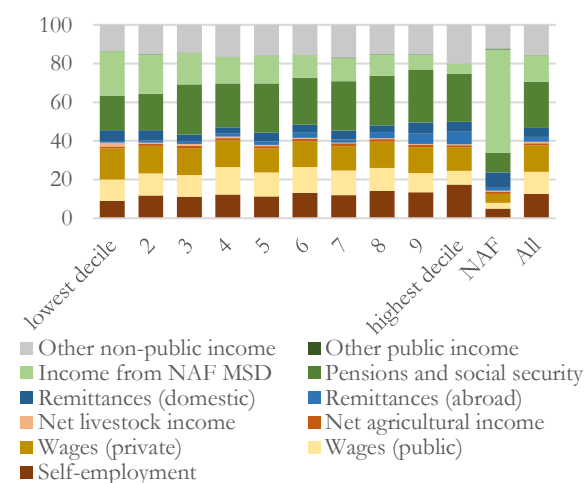
Tourism in our model is not a single economic sector, rather the economic impact of tourism is felt across numerous sectors in Jordan. Tourist arrivals increased from 4.451 million in 2016 to 4.488 million in 2019.<sup>19</sup> Tourist receipts increased from US\$4,049 million to US\$5,794 million over the same period.<sup>20</sup> Tourism in 2016 was estimated to account for 6 percent of Jordan’s GDP, more than one-third of exports and about 88,506 jobs in 2016 (USAID, 2016). According to the Likely scenario tourism exports are forecast to decline by -49.5 percent in 2020 which is equivalent to -17.7 percent of total exports.

## 5.2 The Key Microeconomic Results

### 5.2.1 Pre COVID-19 Household Vulnerabilities

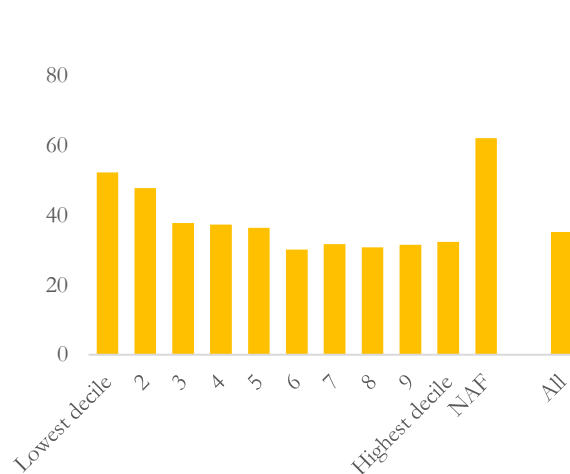
The impact of the COVID-19 shock depends upon the pre-existing vulnerability of different households in Jordan. Around 40 percent of all household income in Jordan came from labour market income, a level relatively constant across deciles (Figure 4). This makes all households vulnerable to some extent to loss of employment imposed by the lockdown and economic shock. Moreover, informality, while particularly high for the poor – around half of all workers in the poorest two deciles are informal – is nonetheless a feature across the distribution, at around a third of workers in most deciles (Figure 5). Around another 40 percent of income comes from public transfers, more weighted to social assistance (National Aid Fund, NAF) for poorer households and pensions for richer ones. Remittances are not insignificant, primarily from domestic sources for poorer households and international sources for richer ones. Remittances are not insignificant, primarily from domestic sources for poorer households and international sources for richer ones.

**Figure 4 Sources of Household Income (percent of total)**



Source: 2017-18 HEIS.

**Figure 5 Degree of Informality by Decile (percent of workers in decile)**



Source: 2017-18 HEIS.

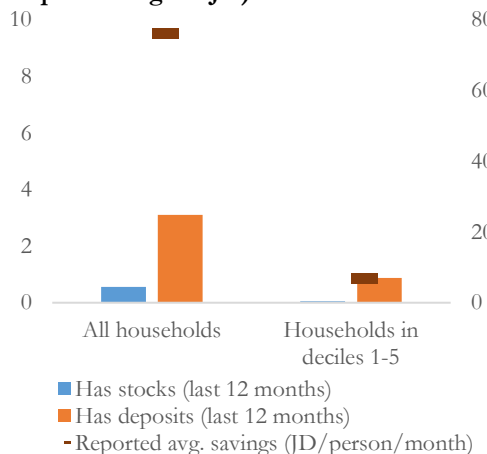
Not only are households vulnerable to lost income from labour and remittances, many have little if any savings, such as stocks and banking deposits, to smooth consumption. Less than 5 percent of Jordanian households report making banking deposits or buying stocks/bonds in the last 12 months up until the survey (Figure 6). For the few households who save some money (2.4 percent), the reported monthly household savings were JD 76, on average. However, for the bottom half of the distribution, only 1.4 percent had made savings and at an average of only JD 7 per month. While more households own durable assets, these may be difficult to sell at a time of economic duress for all households.

<sup>19</sup> Data sources: USAID (2016, 2020).

<sup>20</sup> Data sources: CBJ.

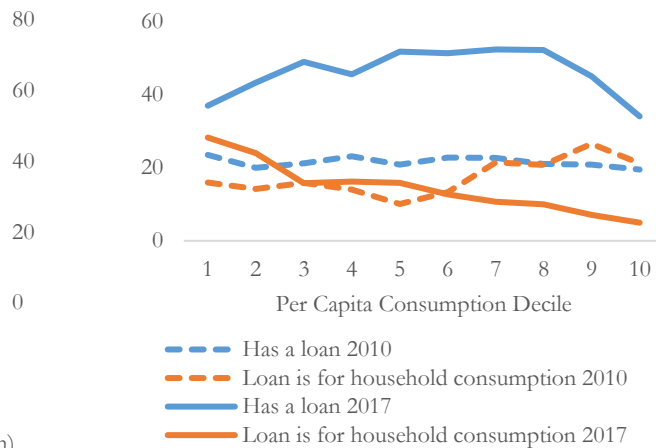
Moreover, not only do most households have few liquid assets they can use to cushion the impact of income losses, many households had already borrowed before the crisis, limiting their ability to do so now. Around half of all households had loans at the time of the survey, but the poorest 20 percent borrow much more to meet household consumption needs (Figure 7). Rates of borrowing were significantly higher at the beginning of the crisis than in 2010, when less than a quarter of households had loans, while borrowing for consumption was more common amongst richer households.

**Figure 6 Household Savings**  
(LHS: percent with savings; RHS: average monthly per capita savings in JD)



Source: 2017-18 HEIS.

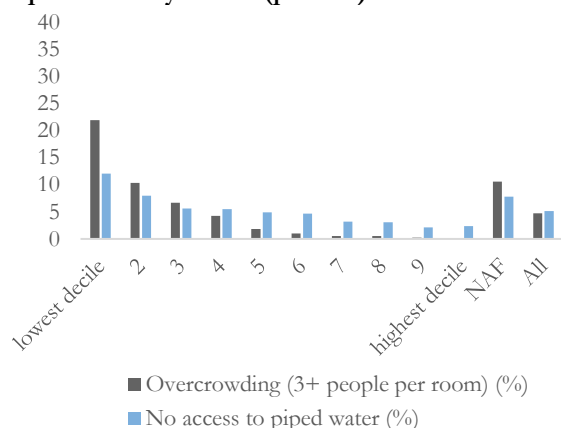
**Figure 7 Household Borrowing by Decile**  
(percent of households with loans)



Source: 2010-11 and 2017-18 HEIS.

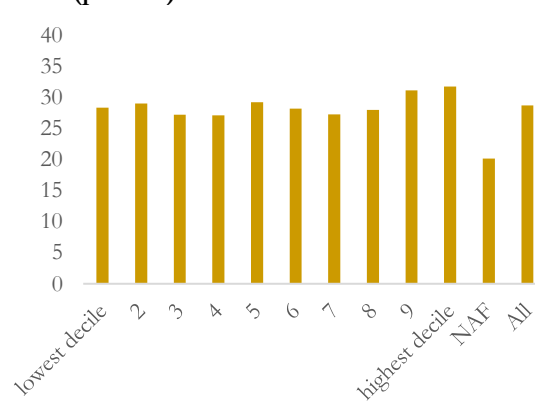
At the same time, poorer households are more likely to live in overcrowded households and less likely to have access to piped water, making them more vulnerable to spreading the disease at home (Figure 8). However, they are not less likely to have health insurance. Around a third of all households lack health insurance, but whereas richer households access it through paid contributions through formal employment and the civil service, other households across the distribution are beneficiaries of the government's Health Insurance Program (HIP), where the government pays the contributions instead (Figure 9).

**Figure 8 Overcrowding and Lack of Access to Piped Water by Decile (percent)**



Source: 2017-18 HEIS.

**Figure 9 Health Insurance Non-Coverage by Decile (percent)**



Source: 2017-18 HEIS.

### 5.2.2 Projected Microeconomic Impacts of the Crisis

The immediate impact of the crisis, in which the government imposed a total curfew on all households for nearly eight weeks is estimated to have been stark. Figure 10 presents the projected path of the national

poverty rate by month since the crisis began, under the Likely Scenario.<sup>21</sup> The red line shows the poverty rate after accounting for lost labour and remittance income. In the first month, poverty doubles, increasing by around 15 percentage points to leave nearly a third of all Jordanians below the poverty line. It would be useful to clarify given the number of foreign workers in industry, agriculture etc. Over the near ten weeks that it took for all sectors to open up and economic recovery begins, this immediate shock of lockdown decreases, but the ongoing trade shock from the CGE model means that it takes until the end of 2021 before poverty approaches the baseline level. Even then, it remains above the level poverty would have fallen to if the crisis had not occurred and the economy had continued to enjoy modest growth, represented by the black dotted line.

The demand shock due to the crisis coming from the CGE model means that the increase in the poverty rate from the income shock is somewhat mitigated by significantly lower prices for goods and services (see section 5.1.4), meaning real household consumption falls by less than the income shock. The combination of the income shock and deflation on poverty in 2020 is shown by the blue line, which while still high, is lower than the income shock alone. However, as the economic recovery continues and demand recovers, a return to positive inflation in 2021 means that by the end of 2021, the mitigation due to a lower cost of living disappears. On aggregate, by the end of 2021, the combination of economic recovery to pre COVID-19 levels of wages and employment as well as prices, coupled with the increase in public sector wages in 2021 means that poverty will end up around 0.6 points below the forecast non COVID-19 counterfactual, reflecting the low growth of the counterfactual.<sup>22</sup>

Finally, the government emergency cash transfer and continued expansion of the social safety net are also modelled. This has two components. First, the government is continuing to expand its permanent poverty-targeted cash transfer program, Takaful. Existing and new Takaful beneficiaries receive a temporary top-up to their monthly payments for six months during 2020. In addition, a much wider temporary six-month payment, also poverty-targeted, is also being made to households who were not social assistance beneficiaries at the beginning of the crisis.<sup>23</sup> In addition, the government will continue to expand Takaful another 30,000 households in 2021, taking the total to 85,000 households, although top-up payments in 2021 are not currently planned. The total impact of the crisis after income shocks, changes in prices and accounting for the government response is shown by the green line. While the government assistance mitigates less than half of the initial shock in the first two months, as the economy begins to reopen and incomes recover, along with lower consumer prices, the poverty rate begins to fall and the government assistance (modelled in July 2020) is able to push the poverty rate almost to where it would have been without the crisis by the end of the six months of temporary payments. Although poverty jumps up when the temporary payments are scheduled to finish, the economic recovery is projected to kick in, which, combined with the permanent expansion in Takaful in 2020 and 2021 as well as increases in public sector wages, means that poverty falls below the non-COVID-19 counterfactual and ends 2021 around 1.5 percentage points lower.

While the poverty rate is projected to have leapt significantly immediately after the crisis began, the extent of impoverishment was even greater. The poverty gap – a measure of how far below the poverty line poor households are on average – nearly tripled, from 3.4 percent to 10.8 percent (see **Error! Reference source not found.** and Figure 15 in Appendix). This means the increase in the degree of impoverishment was substantially higher even than the increase in the number of poor.<sup>24</sup>

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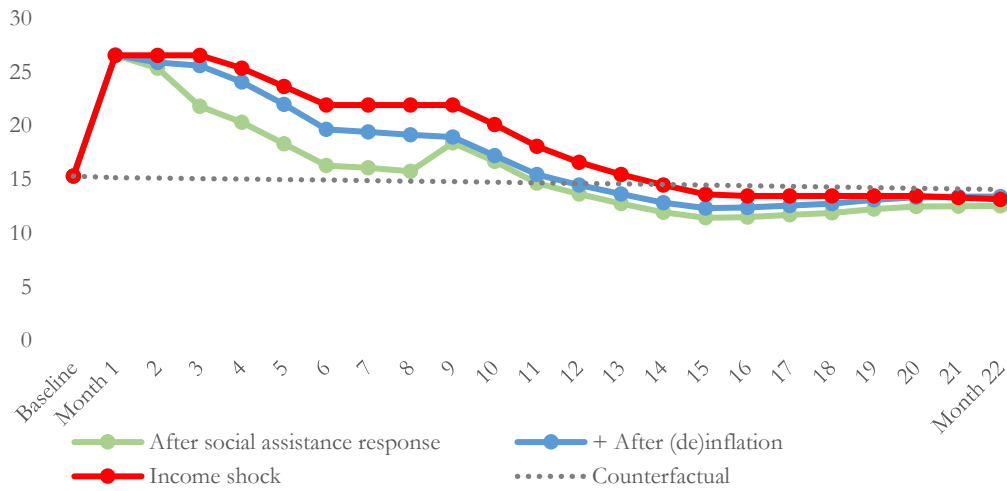
<sup>21</sup> The initial poverty rate is slightly lower than the official poverty rate estimated from the 2017-18 HEIS data. This is due to the nowcasting from the time of the survey to the beginning of the crisis. This is not meant, and not to be taken as, an estimate of the poverty rate at the beginning of 2020 but is done instead to bring the model up to date to current prices. The precise level is less important than offering a baseline to assess the magnitude of the impact of the crisis.

<sup>22</sup> Most public sector workers are not poor, so the wage increase does not have a significant effect on poverty, but some are nonetheless relatively poor due to having large families which lowers the income on a per capita basis.

<sup>23</sup> There were 45,000 existing Takaful households at the beginning of 2020. Under the government response, an additional 10,000 Takaful households are added in 2020. Top-up payments for all Takaful households take the monthly household benefit level to JD 136 per month from their regular level (which varies by household but is below this). In addition, 185,000 non-beneficiary households also receive JD 136 per month for six months. These households are drawn from the National Universal Registry (NUR) and are estimated to be the next poorest households outside of existing NAF and Takaful beneficiaries.

<sup>24</sup> The poverty gap is defined as how far below the poverty line poor households are on average. For example, the 3.4 percent gap pre-COVID means that poor household per capita consumption was on average only 3.4 percent lower than the poverty line; an

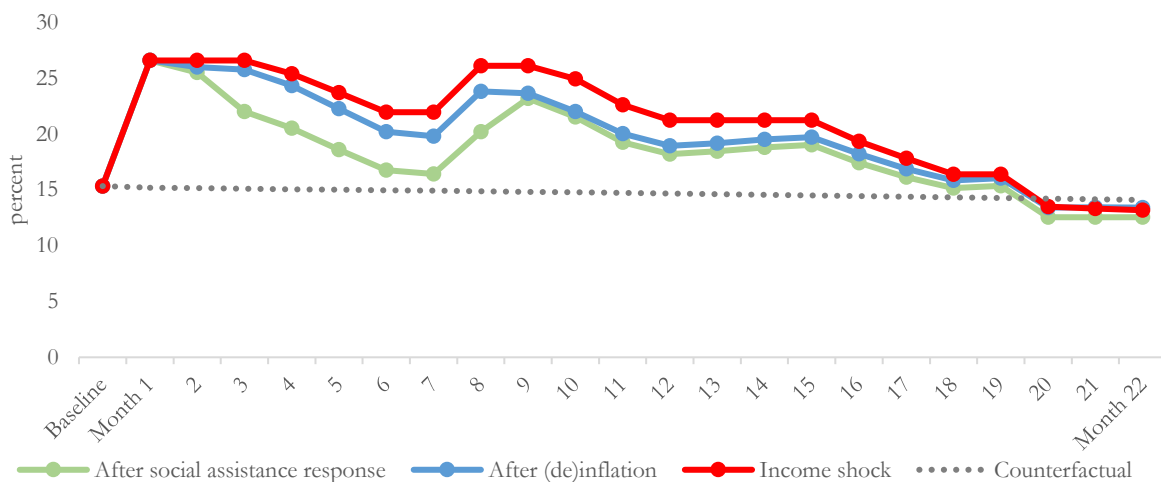
**Figure 10 Projected Poverty Rate by Month until end of 2021, Likely Scenario (percent)**



Source: World Bank calculations.

The analysis above assumes that a full economic recovery will be made by the end of 2021. However, with much unknown about the virus, a dramatic rise in infections in a number of countries worldwide and the lack of a vaccine, there exists a strong possibility of a second wave of infections in Jordan. We also model such an eventuality in late 2020 (in line with the macro-model's Severe Scenario), assuming that the government will reintroduce the same economic lockdowns as it did at the onset of the first wave. Figure 11 presents the results. The second wave and associated leads to a spike in poverty as immediate lockdowns are imposed, coupled with a gradual reduction as economic recovery slowly follows after the removal of lockdown but a renewed trade shock. Initial deflation provides a small degree of mitigation, especially to the poorest as price declines are concentrated in goods and services consumed by the poorest, but no additional government response beyond the Likely Scenario is assumed as fiscal pressures from lost revenue and emergency spending after the first wave may leave little fiscal space for further response. With poverty already high when the second wave is projected to begin, it remains elevated far above both the pre-crisis baseline and the pre COVID-19 scenario by the end of 2021. The poverty gap follows a similar but more extreme pattern (see Figure 16 in Appendix C).

**Figure 11 Projected Poverty Rate by Month until end of 2021, Severe Scenario (percent)**

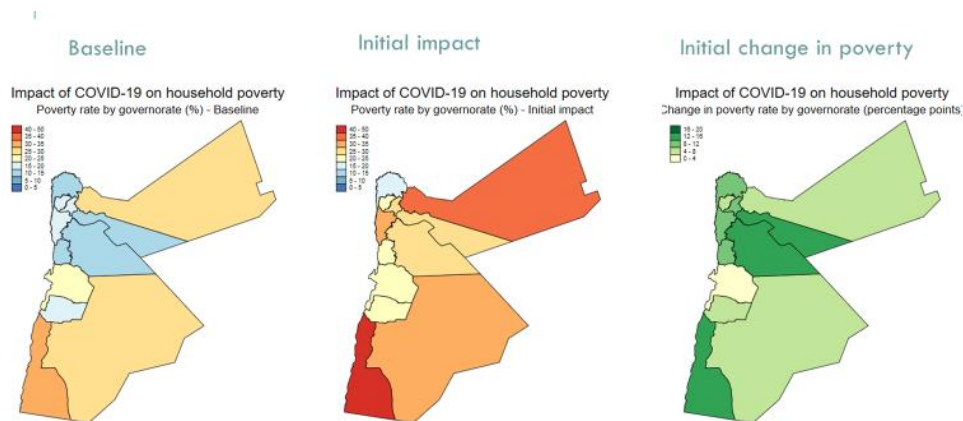


Source: World Bank calculations

increase in consumption of 3.5 percent would bring them above the line and make them not poor. The poverty headcount rate in Figure 10 increased by a factor of 0.75 due to COVID in the first month. The poverty gap increased by a factor of 1.4.

We also examine how the crisis is likely to have affected poverty in different governorates and different sectors. Figure 12 presents a governorate-level poverty map of Jordan, first pre COVID-19 (left panel) and second immediately after the crisis breaks out (i.e. Month 1, centre panel). It also identifies which governorates suffer the greatest impact (right panel). Zarqa and Amman are the two most affected governorates, but Aqaba is the third hardest hit and had the highest pre COVID-19 poverty rate. Precise baseline and immediate impact poverty rates for each governorate are in Figure 17 in an Annex, which also shows that the impact is disproportionately on urban areas, which see an increase of poverty of twice that of rural areas.

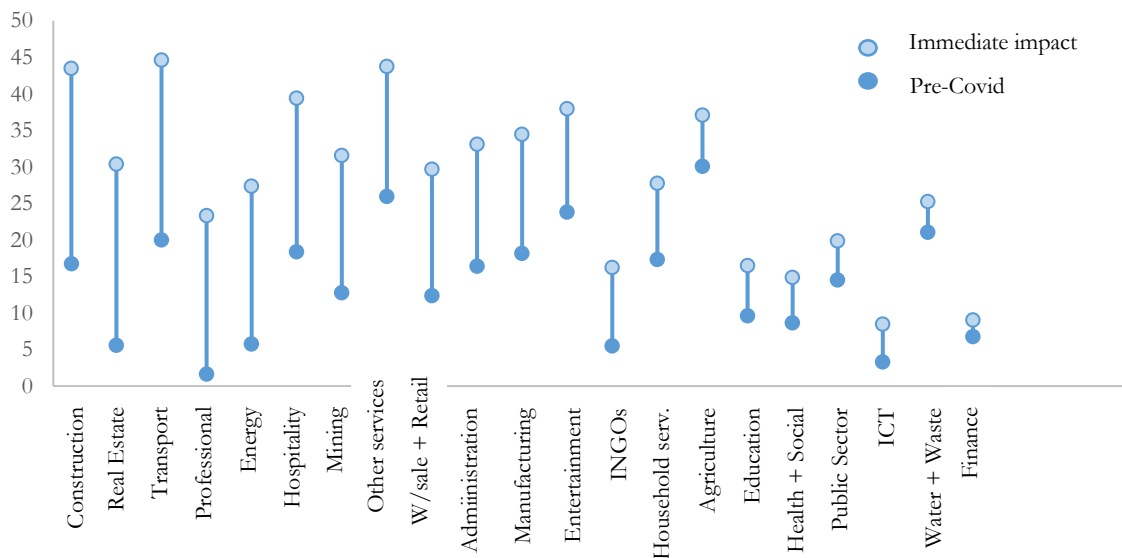
**Figure 12 Projected Initial Poverty Impact by Governorate (map), Likely Scenario**



Source: World Bank calculations

The sectors most affected (Figure 13) are a combination of those with the most interpersonal interactions and those with the highest degree of informality (see Figure 17 in Appendix C). Construction, transportation and real estate are projected to be most affected, along with other service-oriented sectors such as hospitality and trade. Financial and insurance, water and waste, information and communications and public sectors are projected to be the least affected.

**Figure 13 Projected Initial Poverty Impact by Sector, Likely Scenario (percent)**



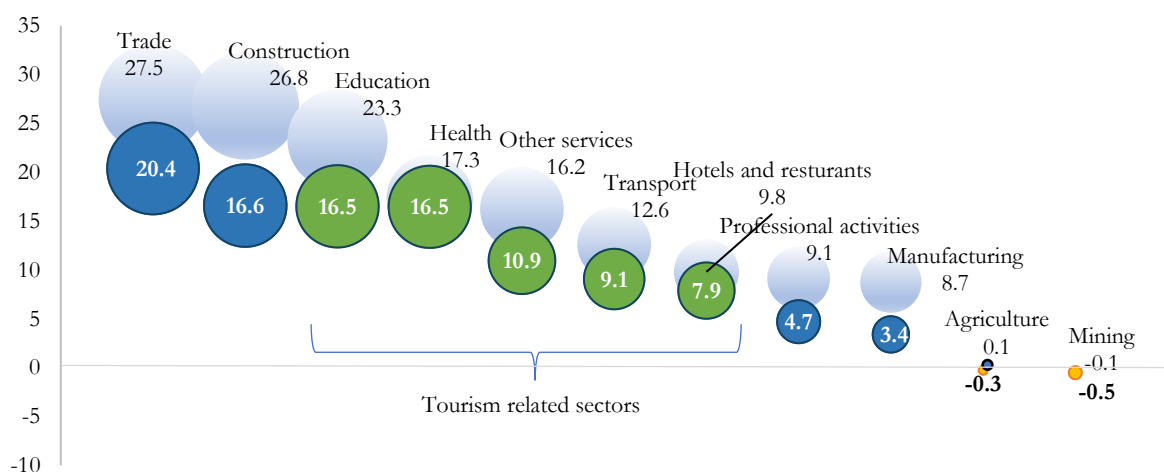
## 6. Mitigation Measures

### 6.1 Flexibility in Wage and Current Account

In response to the COVID-19 crisis the GoJ implemented a number of crisis-mitigation measures. In an effort to protect employment (and its budgetary position) the government reduced nominal wages of public sector workers by 10 percent from Q2-Q4, led to an annualized 7.5 percent decrease. Defence order for March 2020 temporarily suspended some clauses in both the Social Security and Labor Law of Jordan. These changes were intended to prevent layoffs in the formal private sector by mandating firms to retain labour but permitting them some flexibility in reducing wages. Firms operating in sectors that were open could reduce wages by up to 30 percent, provided workers agree and wage cuts also apply to management. Firms in sectors that had been locked down could request permission to reduce wages up to 50 percent provided reduced wages are not below the minimum wage. Firms that cannot pay wages could request a temporary suspension of activities during which workers are put on temporary leave. We assume that the wage cut applied according to our estimates of the severity of the lockdown. A severity of 0 percent giving wage cuts of 30 percent and a severity of 100 percent giving wage cuts of 50 percent. Any intermediate level of severity leading to weighted averages in terms of wage cuts. We also adopt the IMF-RFI projections<sup>25</sup> on current account deficit (nominal value) in this model, which is an additional JD 1 billion deficit from earlier position.

The impact of these two mitigation measures (called current mitigation) reduces the decline in GDP to -6.2 percent (from -8.4 percent in the likely scenario). The government budget deficit was -6.8 percent of GDP (compared to -8.6 percent). This gave the GoJ a little bit more fiscal space to think of implementing further mitigation measures. There was little change in the GDP deflator, a decline of 23.9 percent (compared to 22.7 percent decline in likely scenario). Current account deficit as percentage of GDP under our current assumption widens to 8.9 percent (compared to -4.4 percent of GDP in the likely scenario earlier). The most striking difference was the impact on employment where one-third of job losses are saved. Wage flexibility in the formal sector will reduce wage income but protect employment. Figure 14 below shows the impact of the mitigation measures by economic sector. Of note, 10,000 in construction, around 7,000 jobs will be saved in trade, 6,800 in education, 5,300 in manufacturing and 4,400 in professional activities.

Figure 14 Mitigation and Job Losses (in thousands)



<sup>25</sup> IMF Country Report No. 20/180. Jordan: Request for Purchase under the Rapid Financing Instrument. <https://www.imf.org/~media/Files/Publications/CR/2020/English/1JOREA2020002.ashx>.

## 6.2 Additional Possible Mitigation Measures

A second round of mitigation measures was analysed, not to forecast the impact of mitigation policies actually implemented, but to gauge what package of interventions would be necessary to simultaneously, firstly, reduce the COVID-19 impact on GDP decline (to a maximum of -4 percent) and secondly, to sustain the consumption levels of the poorest households in first three deciles. Here we also include the impact of wage flexibility in the formal sector. Looking back to Table 3 we modified our assumptions regarding international tourism. We assumed instead that international tourism gradually resumes after six months, from September 2020 and is largely back to normal in 2021.<sup>26</sup> Using the CGE model we estimated that an additional JD161 million in government transfers would be required to maintain the real consumption levels of bottom thirty percent households at the pre-COVID-19 baseline levels.

The second column of Table 11 below shows the impact of the actual mitigation measures (as discussed in Section 6.1) and the final column the impact of this full raft of extra mitigation measures. The impact of the extra mitigation efforts demonstrates that GDP decline can be held to -4.0 percent and the consumption of the bottom 30 percent of households protected. The costs of doing so are a very large current account balance (-11.9 percent) which will require longer-term financing to prevent these early gains being reversed by a delayed current account crisis. Of interest in this table is the relatively limited impact of the rapid recovery in tourism (third column). Despite the much discussed ‘dependence’ of the Jordanian economy on tourism the rapid recovery of tourism will only have a minimal impact on GDP growth, investment, the current account balance and the government operational balance. Investment in Jordan is very dependent on imported equipment and inputs. A larger current account deficit (Additional current account deficit (of almost JD1 billion) on top of current mitigation) permits higher investment (to 16.2 percent of GDP) and so reduces the decline in GDP (to -4.0 percent).

**Table 11 Proposed Mitigation Measures**

	<b>Current Measures</b>	<b>+Faster tourism recovery</b>	<b>+Flexible current account</b>	<b>+Government transfers</b>
Real GDP Growth (%)	-6.2	-5.4	-4.0	-4.0
GDP Deflator (% change)	-23.9	-22.4	-19.4	-18.9
Investment	11.2	11.6	16.2	15.6
Current Account Balance (including grants)	-8.9	-8.6	-12.0	-11.9
Operational Balance	-6.8	-6.2	-5.0	-5.6

Note: 1. percent of GDP, unless otherwise specified.

2. Current measures include wage cuts (as per defence order for the private formal sector while annual 7.5% nominal wage cut is assumed for the public sector employee) and additional JD1 billion current account deficit.

3. Faster tourism recovery: International travel gradually resume in September 2020 and back to normal in 2021 (as per CBJ assumptions).

4. More flexible current account: Additional current account deficit (of almost JD1 billion) on top of current mitigation.

5. Government transfers: Additional JD161 million government transfers are needed to maintain real consumption levels of bottom thirty percent households at the pre COVID-19 baseline levels.

## 7. Conclusion - Potential Downsides

In general, our results are optimistic. The likelihood is that Jordan will experience a short and sharp economic recession and that economic growth will recover rapidly. The impact on the poorest 30 percent of households will likely be short-lived and can be mitigated even in the short run at relatively low cost. However, the experience of the L-shaped decline in economic growth after 2010 should remind us to pay attention to potential risk factors going forward.

**The Growth Revival and Sustained Economic Growth in Jordan:** The 2020 crisis hit an economy locked into a cycle of slow economic growth with low and declining investment. The likely and severe scenarios do forecast a rapid recover of growth in 2021 but that the low rate of investment is forecast to

<sup>26</sup> While Jordan is now fully open for foreign tourism this will require that restrictions on foreign travel be lifted in Jordan tourist origin countries, particularly elsewhere in the Middle East, Europe and the US. This could be through the mechanism of ‘tourist corridors’ from origin countries to destinations such as Jordan that experienced low levels of COVID-19 mortality and morbidity.

remain at around 10 percent of GDP until 2022 and beyond. With little investment in new machines, roads and factories investment is forecast to make a limited contribution to GDP growth. Investment from 2020 onwards is forecast to be insufficient to replace the existing capital stock (machines, roads, and factories) and the capital stock will start shrinking. Growth accounting exercises carried out using the CGE model show that under both the Likely and Severe scenarios investment will be making a negative (-0.9 percent) contribution to economic growth in 2023.

*Can the Government of Jordan go beyond 'coping with COVID-19' and implement wider economic reforms to boost investment and economic growth over the medium term?*

**One-shot or Continuing Mitigation Measures:** Sections 6.1 and 6.2 show that mitigation measures have been implemented and could be implemented to reduce the economic and social impact of the COVID-19 crisis in Jordan. There is a risk that a one-shot mitigation effort may simply store up problems for the future. Table 11 above for example demonstrates that a combination of mitigation-interventions can hold GDP growth decline to -4 percent and protect the consumption of the poorest in 2020. But what happens in 2021? This mitigation scenario leaves the GoJ with a very large current account balance (-11.9 percent of GDP) and significant government operational balance (-5.6 percent of GDP). The government may be faced with a funding crisis in 2021 and sharp falls in international reserves held at the Bank of Jordan that forces abrupt cuts in spending and imports. The social and economic consequences of COVID-19 may be mitigated in 2020 but re-appear in 2021.

*How will the mitigation efforts be financed beyond 2020?*

**Hysteresis Effects of an Economic Shock:** Hysteresis effects occur when a temporary shock has a permanent economic impact, even after the shock itself has disappeared. If firms (perhaps airlines, restaurants and department stores) go bankrupt in Jordan due to the short-term shock of the lockdown, when the lockdown is lifted, these businesses may no longer be able to re-open and produce economic output. This is an effect that runs through the loss of or scrapping of the capital stock. If foreign workers in Jordan decide to return home as a consequence of the curfew - perhaps they have less easy access to food and other necessities in Jordan - then they may no longer be available to produce output as the curfew lifts. This effect runs through the loss of part of the labour force. The investment rates were very low in Jordan even before the COVID-19 crisis, and are expected to decline sharply during the crisis and remain low into 2021 and 2022. There are two important questions points here.

*Can the Government of Jordan protect important businesses temporarily through the lockdown and to help them survive the transition from lockdown in 2020 to revived economic growth in 2021 or 2022?*

*Will important economic sectors employing foreign workers (such as agriculture and mining) be able to retain those workers during the curfew and provide longer term employment opportunities for them?*

**The Persistence of the Global Economic Shock:** Likely and severe scenarios assume that global trade will recover in 2021. Developed countries have experienced rapid growth in budget deficits during the 2020 COVID-19 crisis (loss of tax revenue and supporting unemployed workers). The lessons from the 2007-08 Global Financial Crisis indicate that there could be grounds for worry here. After the 2007-08 crisis, developed countries increased taxes and reduced government in an attempt to rapidly close government budget deficits. This continued for 5+ years in many cases. This had the effect of slowing economic growth and also the growth of world trade. The US is an important destination for Jordanian textiles and in 2018 over 90 percent of Jordan's \$1.5 billion of garment exports. Domestic US politics are important.

*Will the US and other developed countries prioritise economic growth or reducing their budget deficits in the medium term once we are past the COVID-19 crisis?*

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## Appendix A: Jordan Recursive Dynamic CGE model - Detailed Shock Specifications

Sector	Lockdown Shock						Export Shock						Import Shock					
	Likely Scenario			Severe Scenario			Likely Scenario			Severe Scenario			Likely Scenario			Severe Scenario		
	2020	2021	2022	2020	2021	2022	2020	2021	2022	2020	2021	2022	2020	2021	2022	2020	2021	2022
Agriculture, forestry and fishing	0.0	0.0	0.0	0.0	0.0	0.0	-10.4	9.9	1.6	-13.5	10.2	5.0	-27	41	5	-29	38	16
Mining and quarrying	-1.3	1.3	0.0	-2.5	2.6	0.0	0.0	0.0	0.0	12.1	3.6	0.0	-19	24	3	-27	34	8
Food, beverages and tobacco	-2.5	2.6	0.0	-5.0	5.3	0.0	-21.3	23.2	3.1	-27.1	24.8	9.8	-27	42	6	-29	37	17
Textile, garments, and leather	-5.0	5.3	0.0	-10.0	11.1	0.0	-10.7	10.2	1.6	-11.2	8.2	4.1	-12	17	3	-14	15	7
Wood, furniture, paper and printing	-10.0	11.1	0.0	-20.0	25.0	0.0	-1.5	1.3	0.2	-3.0	2.0	1.1	-27	37	5	-25	27	16
Coke and petroleum	0.0	0.0	0.0	0.0	0.0	0.0	-49.5	87.4	5.7	-64.9	153.0	12.7	-9	16	2	-11	15	6
Chemicals, Pharmaceuticals, Rubber and Plastic	-0.8	0.8	0.0	-1.7	1.7	0.0	0.0	0.0	0.0	1.5	0.5	0.0	-19	26	4	-21	25	10
Non-metallic minerals	-1.3	1.3	0.0	-2.5	2.6	0.0	0.0	0.0	0.0	10.5	3.2	0.0	-72	116	9	-77	185	24
Other manufacturing	-1.3	1.3	0.0	-2.5	2.6	0.0	-0.3	0.3	0.1	-1.0	0.6	0.4	-29	26	3	-32	35	7
Electricity, gas, steam and air conditioning supply	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.2	-0.1	0.0	21	65	7	15	58	22
Water supply; sewerage, waste management and remediation activities	0.0	0.0	0.0	0.0	0.0	0.0	-49.5	87.4	5.7	-64.9	153.0	12.7	-50	87	6	-65	153	13
Construction	-11.3	12.7	0.0	-22.5	29.0	0.0	-19.9	21.3	2.9	-21.1	17.6	7.7	-66	90	7	-71	144	18
Wholesale and retail trade; repair of motor vehicles and motorcycles	-3.1	3.2	0.0	-6.3	6.7	0.0	-49.5	87.4	5.7	-64.9	153.0	12.7	-50	87	6	-65	153	13
Transportation and storage	-6.3	6.7	0.0	-12.5	14.3	0.0	-36.7	50.6	4.9	-49.2	70.4	15.6	-22	27	4	-23	24	12
Accommodation and food service activities	-12.5	14.3	0.0	-25.0	33.3	0.0	-49.5	87.4	5.7	-64.9	153.0	12.7	-50	87	6	-65	153	13
Information and communication	-0.3	0.3	0.0	-0.5	0.5	0.0	-39.6	57.4	5.1	-49.5	71.1	15.6	-53	123	13	-56	108	43
Financial and insurance activities	-0.4	0.4	0.0	-0.7	0.7	0.0	-23.3	26.2	3.4	-27.9	26.0	10.1	-52	107	11	-57	104	31
Real estate activities	0.0	0.0	0.0	0.0	0.0	0.0	-49.5	87.4	5.7	-64.9	153.0	12.7	-50	87	6	-65	153	13
Professional, scientific and technical activities	-10.0	11.1	0.0	-20.0	25.0	0.0	-49.5	87.4	5.7	-64.9	153.0	12.7	-22	25	5	-19	18	17
Public administration and defence; compulsory social security	-6.3	6.7	0.0	-12.5	14.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0						
Education	-27.7	38.3	0.0	-55.4	124.3	0.0	-30.1	37.2	4.2	-37.9	42.3	13.3	-15	20	3	-3	3	12
Human health and social work activities	0.0	0.0	0.0	0.0	0.0	0.0	-46.1	75.7	5.5	-60.0	117.7	14.9	-21	30	5	-20	27	18
Other service activities	-5.0	5.3	0.0	-10.0	11.1	-10.0	-33.6	44.1	4.6	-41.2	49.1	14.1	-50	87	6	-65	153	13
<b>Total of Operating Surplus</b>	<b>-2.0</b>	<b>2.0</b>	<b>0.0</b>	<b>-3.3</b>	<b>3.4</b>	<b>-3.3</b>	<b>-18.8</b>	<b>20.3</b>	<b>2.3</b>	<b>-23.5</b>	<b>23.9</b>	<b>6.2</b>	<b>-24</b>	<b>31</b>	<b>4</b>	<b>-27</b>	<b>33</b>	<b>11</b>

## Appendix B: Jordan Micro-simulation Model - Assumptions

Sector of activity	Months						
	1 to 4	5 to 7	8 to 10	11 to 13	14 to 16	17 to 19	20 to 22
<b>Formal sector workers</b>							
Agriculture, forestry and fishing	-0.30	-0.06	-0.06	-0.04	0.00	0.00	0.00
Mining and quarrying	-0.36	0.09	0.09	0.05	0.00	0.00	0.00
All manufacturing	-0.37	-0.06	-0.06	-0.04	0.00	0.00	0.00
Electricity, gas, steam and air conditioning supply	-0.30	0.02	0.02	0.01	0.00	0.00	0.00
Water supply; sewerage, waste management and remediation activities	-0.30	-0.30	-0.30	-0.18	0.00	0.00	0.00
Construction	-0.49	-0.20	-0.20	-0.11	0.00	0.00	0.00
Wholesale and retail trade; repair of motor vehicles and motorcycles	-0.35	-0.35	-0.35	-0.21	0.00	0.00	0.00
Transportation and storage	-0.41	-0.30	-0.30	-0.18	0.00	0.00	0.00
Accommodation and food service activities	-0.43	-0.43	-0.43	-0.25	0.00	0.00	0.00
Information and communication	-0.31	-0.25	-0.25	-0.15	0.00	0.00	0.00
Financial and insurance activities	-0.31	-0.15	-0.15	-0.09	0.00	0.00	0.00
Real estate activities	-0.30	-0.30	-0.30	-0.18	0.00	0.00	0.00
Professional, scientific and technical activities	-0.47	-0.47	-0.47	-0.27	0.00	0.00	0.00
Administrative and support services	-0.47	-0.47	-0.47	-0.27	0.00	0.00	0.00
Public administration and defence; compulsory social security	-0.10	-0.10	-0.10	0.10	0.09	0.09	0.09
Education	-0.50	-0.30	-0.30	-0.18	0.00	0.00	0.00
Human health and social work activities	-0.30	-0.28	-0.28	-0.16	0.00	0.00	0.00
Arts, entertainment and recreation	-0.38	-0.26	-0.26	-0.15	0.00	0.00	0.00
Other service activities	-0.38	-0.26	-0.26	-0.15	0.00	0.00	0.00
Activities of households, other goods and services	-0.38	-0.26	-0.26	-0.15	0.00	0.00	0.00
Extraterritorial organizations and bodies	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<b>Informal sector workers</b>							
Agriculture, forestry and fishing	-0.50	-0.11	-0.11	-0.06	0.00	0.00	0.00
Mining and quarrying	-0.65	0.16	0.16	0.09	0.00	0.00	0.00
All manufacturing	-0.66	-0.11	-0.11	-0.06	0.00	0.00	0.00
Electricity, gas, steam and air conditioning supply	-0.50	0.03	0.03	0.02	0.00	0.00	0.00
Water supply; sewerage, waste management and remediation activities	-0.50	-0.50	-0.50	-0.29	0.00	0.00	0.00
Construction	-0.96	-0.39	-0.39	-0.23	0.00	0.00	0.00
Wholesale and retail trade; repair of motor vehicles and motorcycles	-0.63	-0.63	-0.63	-0.37	0.00	0.00	0.00
Transportation and storage	-0.76	-0.56	-0.56	-0.33	0.00	0.00	0.00
Accommodation and food service activities	-0.81	-0.81	-0.81	-0.47	0.00	0.00	0.00
Information and communication	-0.53	-0.42	-0.42	-0.25	0.00	0.00	0.00
Financial and insurance activities	-0.53	-0.25	-0.25	-0.15	0.00	0.00	0.00
Real estate activities	-0.50	-0.50	-0.50	-0.29	0.00	0.00	0.00
Professional, scientific and technical activities	-0.91	-0.91	-0.91	-0.53	0.00	0.00	0.00
Administrative and support services	-0.91	-0.91	-0.91	-0.53	0.00	0.00	0.00
Education	-0.99	-0.60	-0.60	-0.35	0.00	0.00	0.00
Human health and social work activities	-0.50	-0.47	-0.47	-0.27	0.00	0.00	0.00
Arts, entertainment and recreation	-0.71	-0.48	-0.48	-0.28	0.00	0.00	0.00
Other service activities	-0.71	-0.48	-0.48	-0.28	0.00	0.00	0.00
Activities of households, other goods and services	-0.71	-0.48	-0.48	-0.28	0.00	0.00	0.00
Extraterritorial organizations and bodies	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Note: To smooth quarterly variations, the income fall in transition months is the weighted average of the concurrent (previous) and the next (concurrent) quarter. The weight for the concurrent month is two-thirds.

## Appendix C: Jordan Micro-simulation Model - Additional Results

Figure 15 Projected Poverty Gap by Month until end of 2021, Likely Scenario (percent)

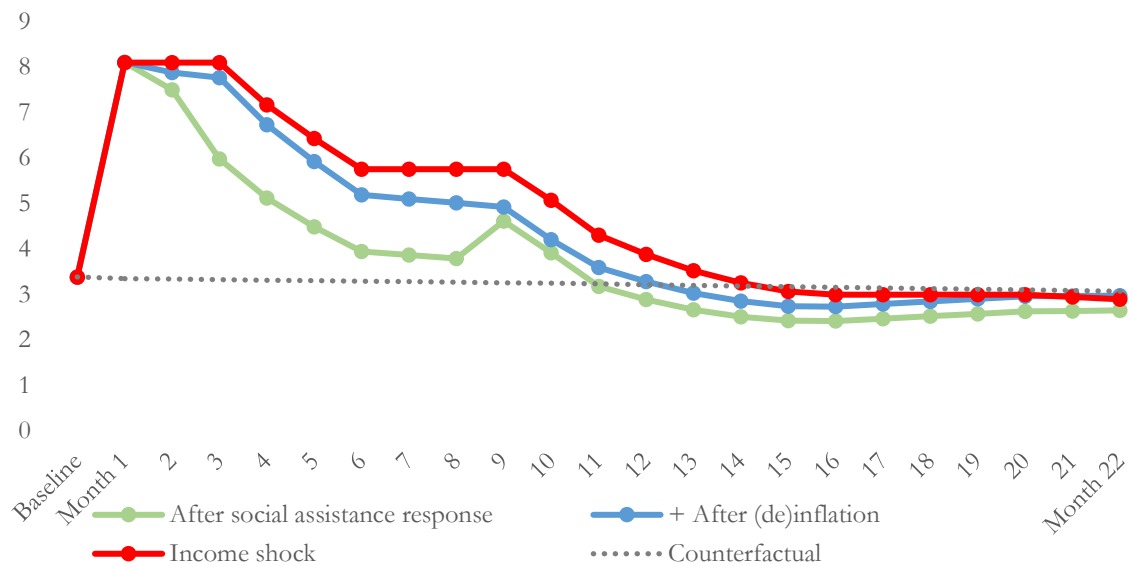


Figure 16 Projected Poverty Gap by Month until end of 2021, Severe Scenario (percent)

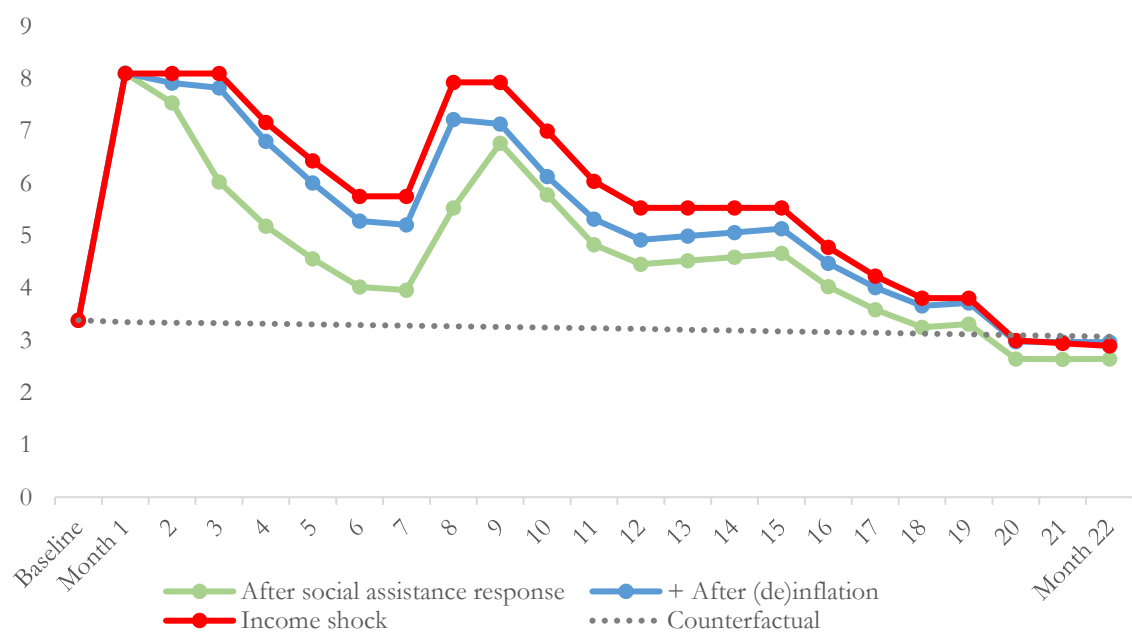


Figure 17 Projected Initial Poverty Impact by Governorate, Likely Scenario (percent)

