

The Short-Run Economic Costs of COVID-19 in Developing Countries in 2020

A synthesis of results from a multi-country modeling exercise

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Introduction

As COVID-19 spread across the globe in early 2020, governments had to make difficult policy choices to balance the socioeconomic costs of social distancing and lockdown measures, on the one hand, and the human costs of increased morbidity and mortality of an unchecked pandemic, on the other. The challenge was particularly daunting for developing countries with their often ill-equipped and underfunded health systems coupled with general skepticism about the effectiveness of economic restrictions to curb viral spread, especially in densely populated informal urban communities (The Economist 2020). Poorer developing country populations also tend to be less resilient to income shocks, while the social protection measures needed to mitigate against income losses are costly. With developing country governments already heavily indebted before the pandemic (Onyekwena and Ekeruche 2019), and with further anticipated losses in tax revenues due to COVID-related economic restrictions, their ability to finance palliative measures without sacrificing much-needed, longer-term public investments has remained a major concern.

Countries adopted broadly similar measures to reduce the spread of COVID-19, all entailing restrictions on movement and physical interaction of people through limits on travel, social distancing, or in more extreme cases, shutting down non-essential economic activities. Closure of international borders was also common. While governments had some control over these domestic measures, they could do little to shield their economies from disruptions in global supply chains and commodity markets and weakening demand for their exports. With their lower levels of economic diversification and reliance on a limited range of export commodities for foreign exchange earnings, developing countries were expected to be particularly vulnerable to these global shocks. And early indications were that they would be substantial: global tourism was expected to fall by 59 to 78 percent in 2020 (UNWTO 2020); developing country trade volumes were forecasted to decline by 9 percent (IMF 2020); the collapse in crude oil demand caused prices to drop by 40 percent in March 2020 alone (IEA 2020); global foreign direct investment flows were expected to fall by 30 to 40 percent (UNCTAD 2020); and households faced sharp declines in private remittances, ranging from 13 percent in Asia to 23 percent in sub-Saharan Africa (World Bank 2020).

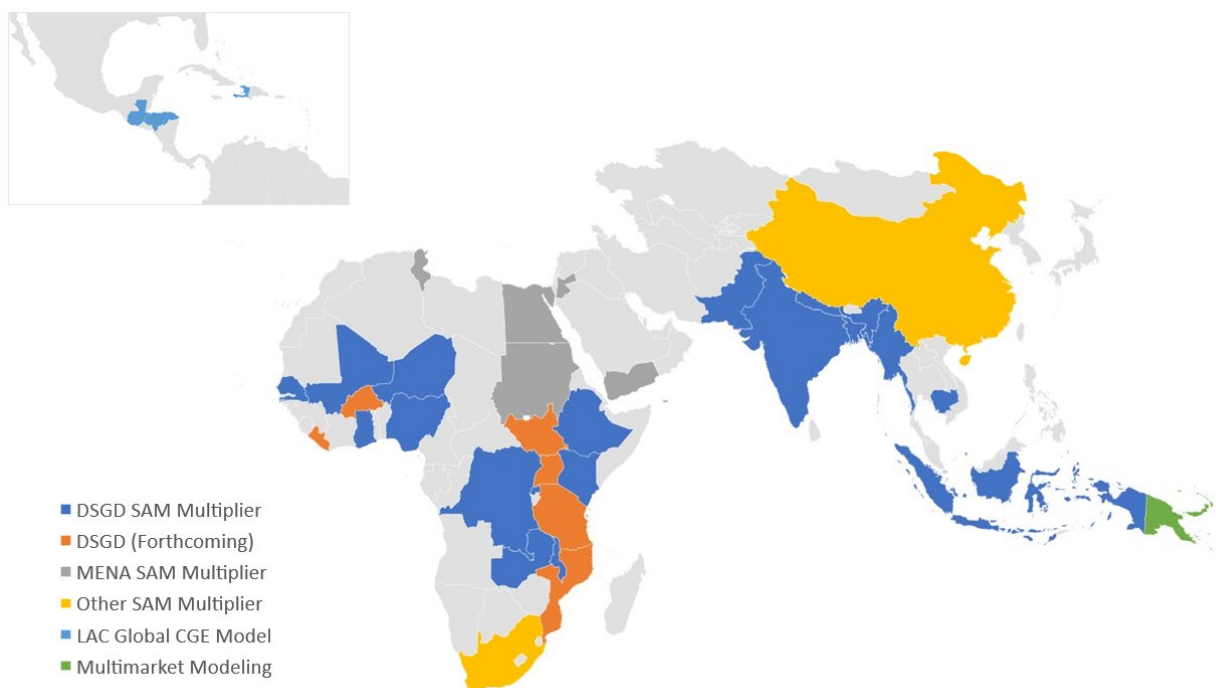
Given uncertainty about the likely economic impacts of COVID-19 restrictions and external shocks, IFPRI's country modeling team worked with government partners, local think tanks, and IFPRI country programs to evaluate the short-run economic costs of COVID-19 in a number of developing countries. The team is housed in IFPRI's Development Strategy and Governance Division (DSGD) and received support from the Bill and Melinda Gates Foundation (BMGF), the United States Agency for International Development (USAID), and the CGIAR Research Program on Policies, Institutions, and Markets (PIM) to undertake the analyses. Social Accounting Matrix (SAM) multiplier models for each country were used to trace the direct and indirect (spillover) effects of policy-induced or external shocks along and across supply chains. The short-run analysis was designed to: (a) assess the exposure of national food systems to COVID-19 shocks; (b) identify vulnerable sectors, workers, or population groups; and (c) recommend policies to mitigate risks to livelihoods and food security. Following these initial analyses, a second phase of the project will identify policy and public investment priorities for economic recovery from the pandemic over the 2021 to 2025 period. For those analyses, single-country Computable General Equilibrium (CGE) models will be deployed.

Country coverage

To date, in addition to global CGE modeling analysis of the impact of COVID-19 on poverty (Laborde, et al. 2020), IFPRI has undertaken COVID-19 country modeling analyses in 29 countries, and analysis is ongoing in six additional countries. Most of these studies adopted a SAM multiplier approach for reasons explained further below. This note synthesizes results for 18 of the 29 completed studies, namely Bangladesh, Cambodia, Democratic Republic of the Congo (DRC), Ethiopia, Ghana, India, Indonesia, Kenya, Malawi, Mali, Nepal, Niger, Nigeria, Pakistan, Rwanda, Senegal, and Zambia. These all adopted the same SAM multiplier model framework developed by the IFPRI country modeling team and were directly supported or led by the country modeling team. Similarities across countries in terms of the impact channels simulated and model reporting structures adopted also facilitates cross-country comparison of these studies. In addition to several working papers, at least three of these studies have been published in peer reviewed journals, including studies in Ethiopia (Aragie, Taffesse and Thurlow 2021), Ghana (Amewu, et al. 2020), and Nigeria (Andam, et al. 2020). The six forthcoming studies – Burkina Faso, Liberia, Mozambique, South Sudan, Tanzania, and Uganda – follow the same modeling approach. Future versions of this project note will be updated as new results become available (see Figure 1).

Not considered in this synthesis of SAM multiplier analyses are those undertaken in Egypt (Breisinger, Latif, et al. 2020), Tunisia (ElKadhi, et al. 2020), Yemen (Elsabbagh, Kurdi and Wiebelt 2021), Sudan (Abay, et al. 2020), and Jordan (Raouf, Elsabbagh and Wiebelt 2020) that were led by IFPRI's Middle East and North Africa team; that for China done by IFPRI's China Strategy Support Program (Zhang, et al. 2020); and that for South Africa done by IFPRI's Environment and Production Technology Division (Arndt, et al. 2020). While broadly similar to the DSGD-led country analyses in terms of methods, these other studies adopted different reporting structures or emphasized different aspects of COVID-19 shocks. We also do not include the results of analyses undertaken in Guatemala (Díaz-Bonilla, Laborde Debucquet and Piñeiro 2021), Haiti (Díaz-Bonilla, Piñeiro and De Salvo, et al. 2021), and Honduras (Díaz-Bonilla, Piñeiro and Laborde Debucquet 2021) that were led by IFPRI's Latin America and Caribbean team, which extracted country results from a global CGE model; or those of Papua New Guinea (Diao, Dorosh, et al. 2021), where DSGD modelers conducted a multimarket modeling exercise. In addition to the peer-reviewed publications cited above, working papers, slide decks, or other dissemination materials for all these studies are posted to the project website (IFPRI 2021).

Figure 1. COVID-19 country modeling led by teams from the International Food Policy Research Institute



Source: Authors.

Note: CGE = Computable General Equilibrium; DSGD = Development Strategy and Governance Division, International Food Policy Research Institute; LAC = Latin America and the Caribbean; MENA = Middle East and North Africa; SAM = Social Accounting Matrix.

Methods and scenarios

A Social Accounting Matrix (SAM) is an economywide database that captures resource flows associated with all economic transactions between all agents (e.g., households, producers, or government) in an economy during a calendar year, thus providing a snapshot of the structure of an economy at a point in time (Round 2003). SAM-based multiplier models are used to translate exogenous changes in final demand into endogenous changes in domestic production. Changes in production in one sector can have spillover effects for other sectors that supply intermediate inputs to the expanding sector. By capturing input-output relationships, these potentially important spillover effects are measured in SAM multiplier models. They further capture employment changes as well as employment-induced changes in household incomes.

Although SAM multiplier models have several limitations, most notably the assumption of fixed prices (Breisinger, Thomas and Thurlow 2009), they are ideally suited to simulating COVID-19 shocks. This is because COVID-19 entailed simultaneous disruptions to demand and supply where market mechanisms ceased to function normally and equilibrium could not be reestablished through price adjustments, thus justifying a fixed-price model (Arndt, et al. 2020). Looking forward, as market operations are restored, market-based computable general equilibrium (CGE) models, which are also calibrated to SAMs, will be useful for considering medium- and longer-term policy and investment options for post-COVID economic recovery. CGE models will be employed in the second phase of this project.

The SAMs developed by the IFPRI country modeling team typically include up to 86 economic activities, 11 factors of production, and 15 representative household groups, thus providing very detailed information about the economic structure, specifically with regards to input-output relationships, production multipliers, employment patterns, and the distribution of income. In

addition to similarities in the SAM structure, the same approach is adopted to simulate the impact of COVID-19 induced shocks in all the countries included in this project note. Shocks are imposed as demand or supply shocks in each of the 86 economic sectors in the SAM. Shock values were informed by country experts and based on the design and enforcement of domestic restrictions. All potential domestic impact channels were considered, including, for example, temporary closure of manufacturing or trading operations; closure of restaurants or movie theatres; limitations on public transport or border closures; or banning of public gatherings. External shocks, in turn, were informed by published evidence or projected shocks to private remittances, foreign direct investments, or international trade flows.

In all the studies reported on here, a first set of results measures the impact during the height of restrictions – referred to as the lockdown period – which typically lasted between two weeks and two months from around mid-March 2020. A second set of results take a longer-term perspective, reporting on impacts over the course of the calendar or financial year, assuming either a gradual (slow recovery scenario) or rapid (fast recovery scenario) lifting of restrictions, although not necessarily a complete return to pre-pandemic economic activity levels.¹ In the main body of this synthesis report we compare annual results under the slow and fast recovery scenarios across countries. Additional country-specific and quarterly results are included in the Appendix.

Results and analysis

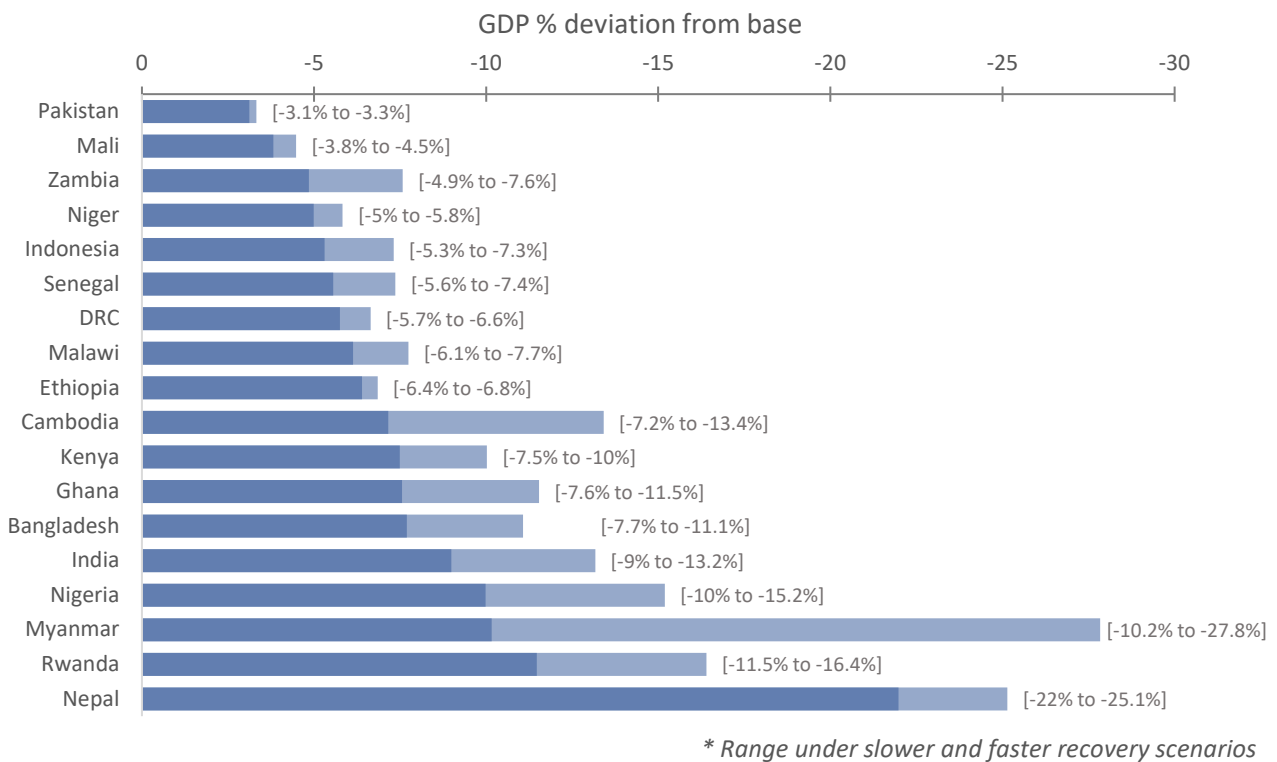
All simulation results are reported as changes relative to a “without-COVID” baseline. Figure 2 presents GDP losses across the eighteen selected countries, ranked here from lowest to highest simulated GDP loss. At the lower end of the spectrum is Pakistan, with anticipated losses of 3.1 to 3.3 percent in 2020, while in Nepal, estimated losses range from 22.0 to 25.1 percent, which is linked to Nepal’s extended 17-week lockdown and subsequent slow easing of restrictions. The median estimated loss range across these countries is 6.3 to 7.7 percent.

Although the SAM multiplier models were not benchmarked against projections by the International Monetary Fund (IMF) – our focus was instead on understanding the sectoral composition of losses and their associated distributional effects within countries – our results are reasonably consistent with IMF growth estimates. Whereas in October 2019 the IMF projected growth of 4.5 percent for developing economies in 2020, their April 2021 projection was revised downwards to –2.0 percent (IMF 2021). Roughly speaking, this translates into a 6.5 percent deviation from the pre-COVID baseline, which is within the median range of estimates from the SAM multiplier models summarized here.

¹ The analyses in Ethiopia, Myanmar, and Nepal were done for the 2019/20 or the 2020/21 financial years. These do not correspond to the 2020 calendar year. For Ethiopia and Nepal, the analysis spans across two financial years, so results can be extracted for the four quarters corresponding to the 2020 calendar year (i.e., Q1: January – March; Q2: April – June; Q3: July – September; and Q4: October – December). Changes in annual GDP in these two countries are also recalculated to reflect the impact during the 2020 calendar year.

The Myanmar study, however, only covered the period October 2019 to September 2020, and no shocks were modeled for the period of October to December 2020. The annual results reported for Myanmar therefore refer to the financial year ending in September 2020 as opposed to the 2020 calendar year. The Myanmar analysis also did not include an analysis of poverty changes.

Figure 2. Estimated reductions in annual national GDP due to economic shocks associated with COVID-19

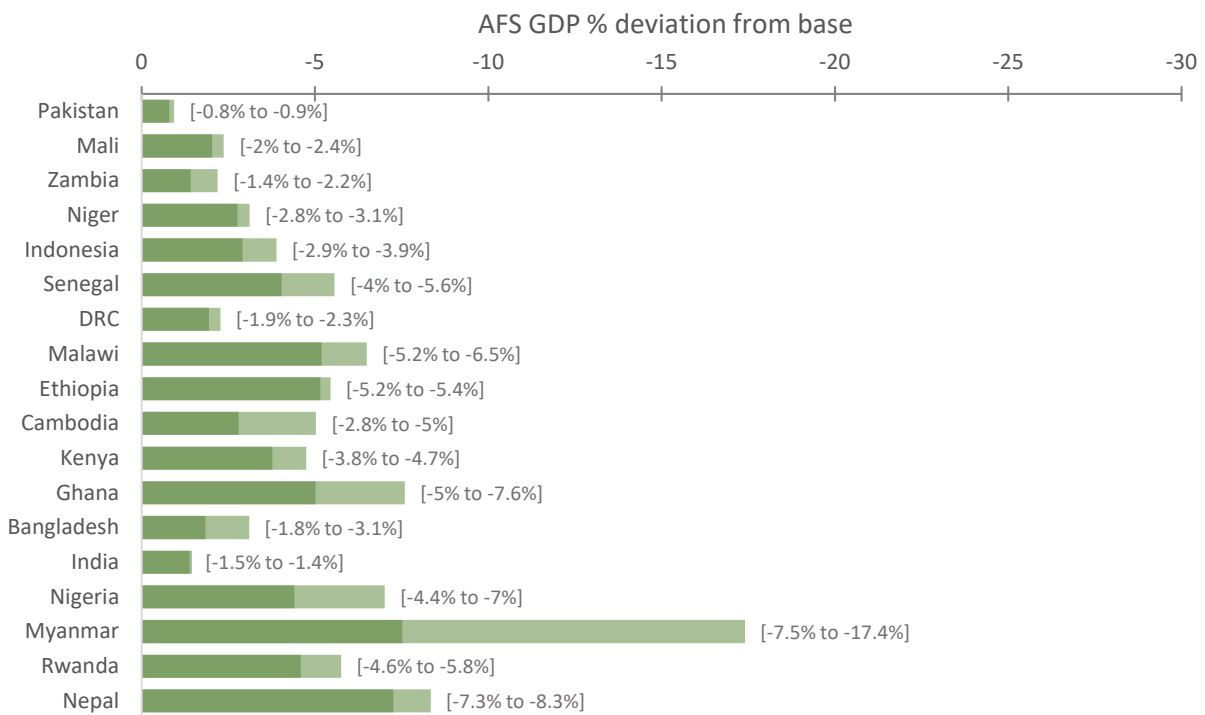


Source: Authors' compilation.

A key objective of the COVID-19 impact assessments was to assess the effects in each country on their broader agri-food system (AFS), which we define as that part of the economy made up of primary agriculture, agroprocessing activities, food services (hotels and restaurants), and food and agriculture-related trade and transport services. As economies grow and transform, the downstream or off-farm components of the AFS tend to become larger. In fact, the off-farm components already account for around one-third of the AFS in sub-Saharan Africa, which means that even as the agricultural GDP share itself declines due to structural transformation, the linkages between agriculture and non-agriculture become stronger. In the context of COVID-19, this is significant: Even though food production and processing were largely exempted from COVID-19 restrictions, disruptions to food supply chains (e.g., due to restrictions on movement of people and goods) and widespread closure of restaurants potentially had significant spillover effects for primary agriculture due to strong backward linkages.

Figure 3 reports changes in annual AFS GDP from the pre-COVID baseline. The GDP ranking from Figure 2 is retained for ease of comparison. Although AFS GDP losses are lower than GDP losses, impacts are still significant considering broad exemptions to the food sector. In some countries, exports of primary agricultural products were disrupted, causing large direct effects within agriculture, and consequently relatively large losses in the AFS. Examples include livestock exports in Rwanda, cocoa exports in Ghana, and tobacco exports in Malawi.

Figure 3. Estimated reductions in annual national agri-food system (AFS) GDP due to economic shocks associated with COVID-19



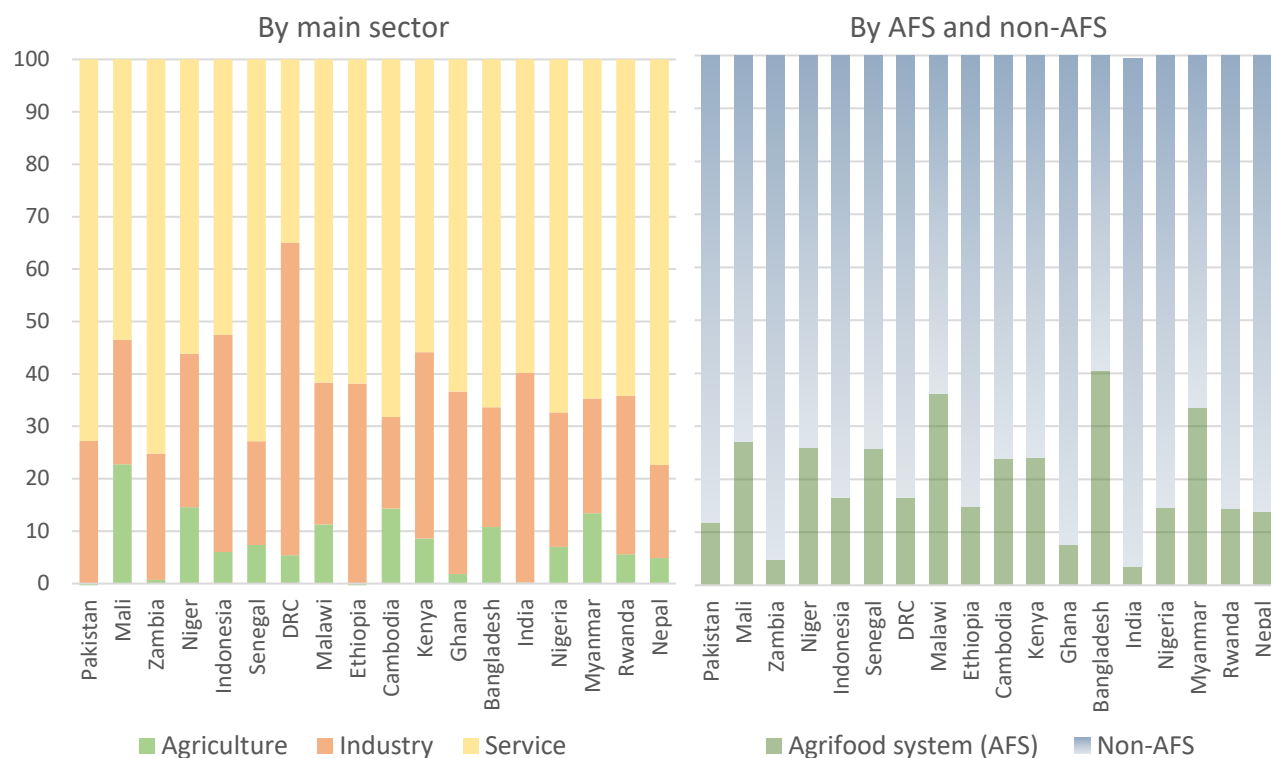
** Range under slower and faster recovery scenarios*

Source: Authors' compilation.

Figure 4 (left panel) shows that losses in the services sectors dominated the overall losses in economic output due to economic shocks associated with COVID-19. This is a result of the combined effect of services often being the largest sector of the economy and the fact that the most common forms of COVID-19 related restrictions disproportionately impacted the sector, including transport, education (school closures), or restaurant services. The collapse of tourism, an important component of the economy in many developing countries, also primarily affected services.

The right-hand side panel in Figure 4 shows a similar breakdown by AFS and non-AFS sectors. Even though losses in the AFS were significant (Figure 3), we again see that they make up a relatively small share of the overall economic losses. The average share of AFS in total GDP losses is around 20 percent, but this share drops as low as 4.9 percent in Zambia where the agricultural GDP share is low and inter-industry linkages are weak.

Figure 4. Estimated sectoral and agri-food system (AFS) contributions to total reductions in GDP due to economic shocks associated with COVID-19



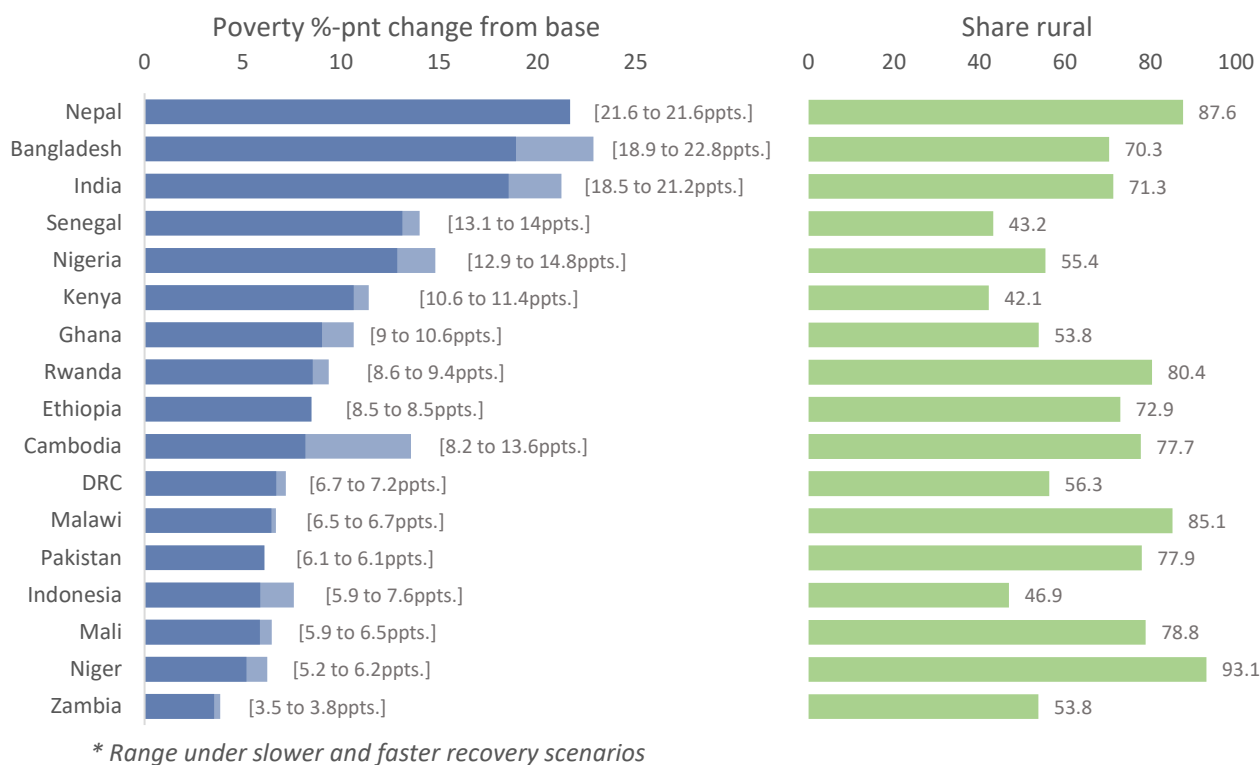
Source: Authors' compilation.

We lastly look at effects on poverty of the economic shocks associated with COVID-19. These are estimated by linking simulated income changes for different household groups in the SAM multiplier model to their corresponding individual households in the expenditure survey. Figure 5 reports percentage-point changes in national poverty headcount rates in the second quarter of 2020 when restrictions in most countries were at their harshest. Countries are ranked from highest to lowest increase in poverty.² The results show what share of the total population become temporarily poor because of COVID-19 induced income losses. The median estimated range of poverty increase is between 8.3 to 8.9 percentage points, although we see substantial variation across countries, consistent with the wide range of GDP impacts.

Two points are worth highlighting regarding the poverty results. First, in many countries our analyses suggest that poverty levels may return to pre-COVID levels (or close to it) by the end of 2020 or midway into 2021. This reflects the fact that current household income flows would likely return to pre-COVID levels. However, it masks the tremendous losses suffered during the height of restrictions when many households would have had to draw down savings or assets to sustain themselves. This greatly increases their vulnerability to future income shocks, and it may take years for households, especially poorer ones, to rebuild their assets.

² The Myanmar study excluded an analysis of poverty changes and is omitted from the figure.

Figure 5. Changes in poverty at the height of restrictions, second quarter 2020



Source: Authors' compilation.

Second, the right-hand panel of Figure 5 shows that two-thirds of people who become poor are in rural areas. This may seem counterintuitive, since our results (not shown here) also show that rural households' income losses tend to be lower than those in urban households. The latter finding is consistent with the fact that restrictions were more likely imposed in urban sectors (e.g., restaurants or manufacturing plants) and/or more likely enforced in urban areas, as opposed to sparsely populated rural areas. Various reasons exist for this finding, and they tend to differ by country. It may reflect strong economic linkages between urban and rural areas, e.g., via demand for agricultural products used as intermediate inputs in urban factories. Alternatively, it may be a size effect related to the fact that the majority of poor people are usually in rural areas, so even a small change in the rural poverty rate will imply a large increase in the number of rural poor. Finally, it may reflect the fact that the poverty elasticity for rural households is high, i.e., even a small loss in rural incomes results in many rural people falling below the poverty line due to their proximity to the poverty line. The implication is that government relief measures should not disregard the impact on rural poverty based on the argument that many of the COVID-19 restrictions that were put in place only affected urban areas directly.

Concluding remarks

COVID-19 has had devastating economic impacts around the globe. IFPRI's multi-country impact assessments based on SAM multiplier modeling provide a more detailed understanding of the extent of these losses as well as their distributional implications. A useful feature of these models is that they are easily updated as new information becomes available. Currently, for example, several countries are requesting additional analysis of the effects of second and third waves of the pandemic.

Detailed country results for the eighteen countries are attached in the Appendix. For the most up-to-date results and results from additional countries, please visit the project website: <https://www.ifpri.org/project/covid-19-measuring-impacts-and-prioritizing-policies-recovery> (IFPRI 2021).

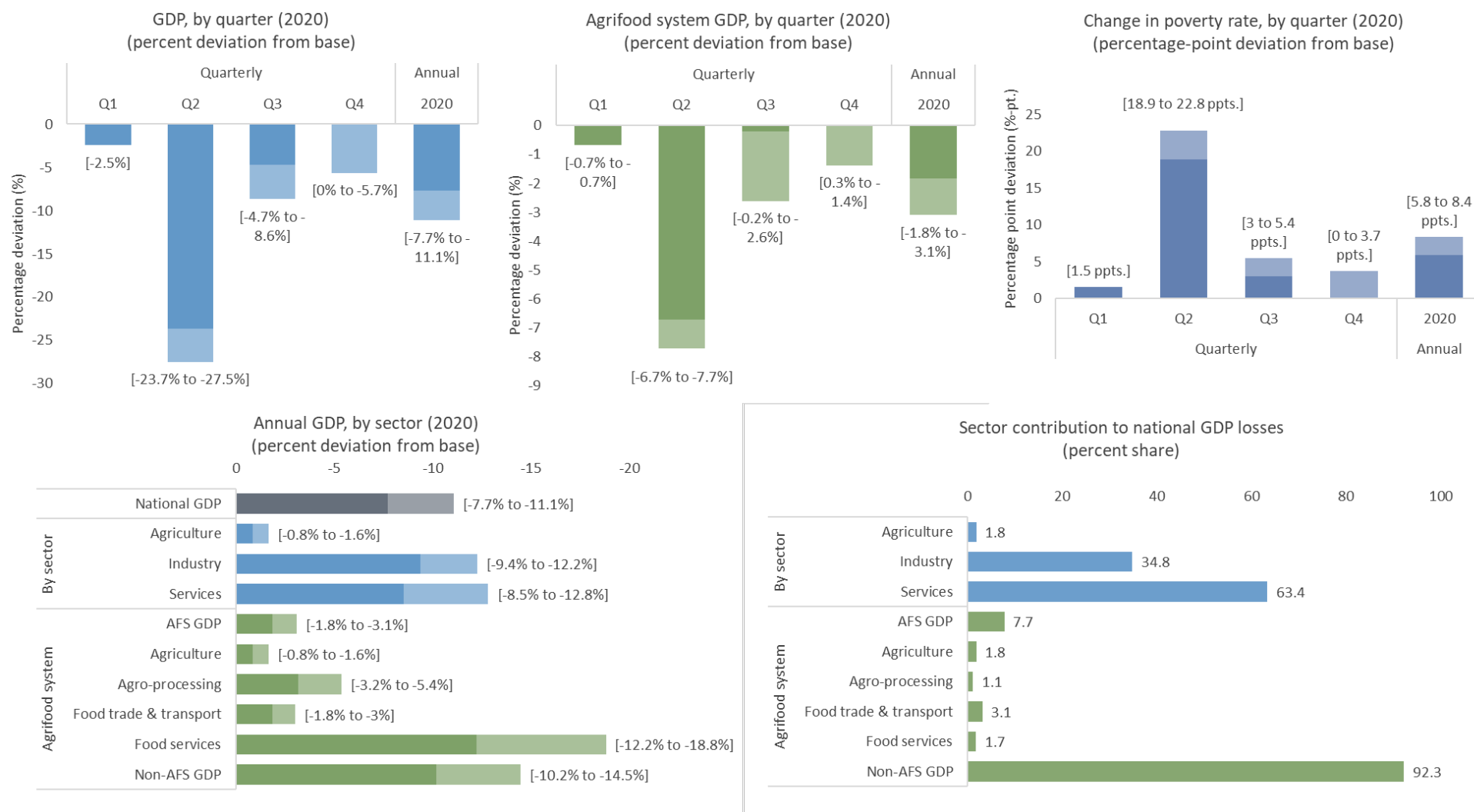
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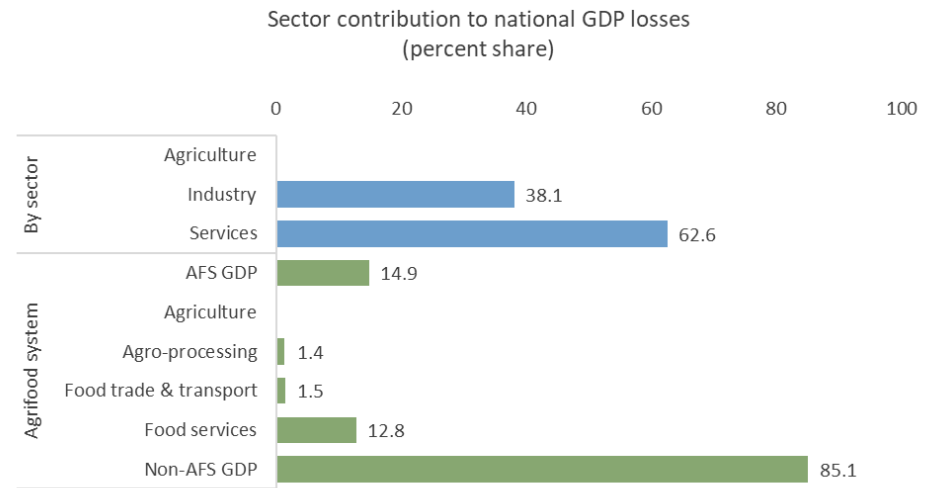
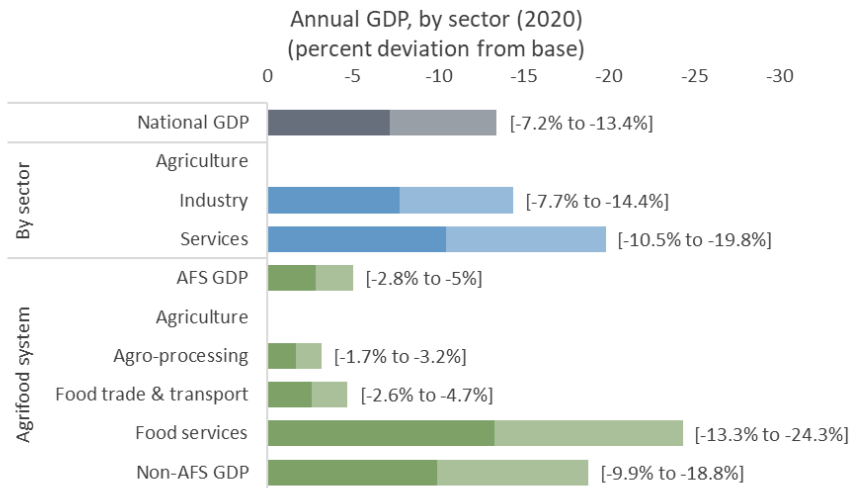
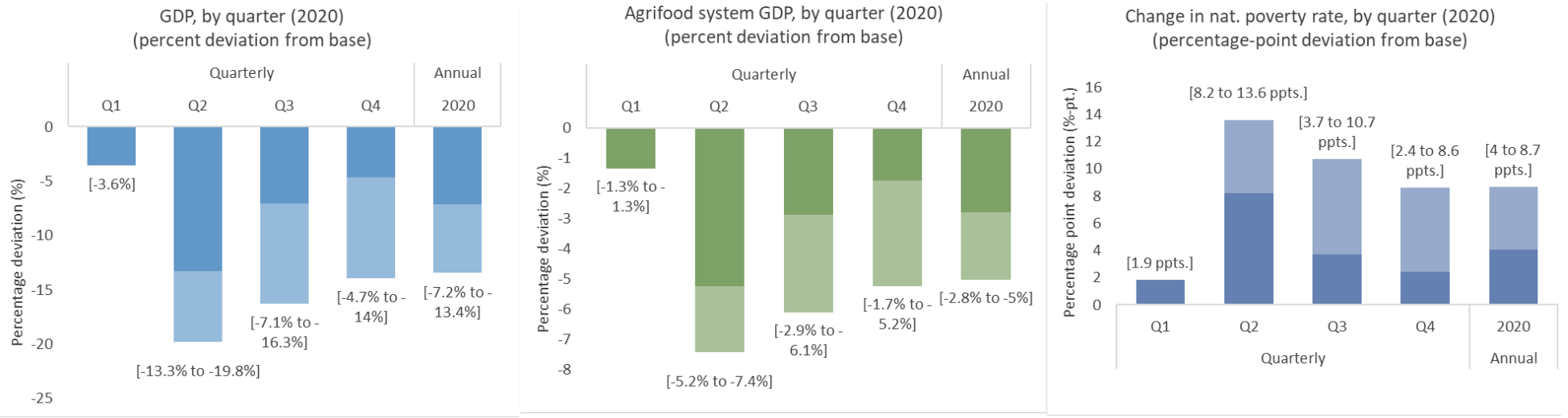
Appendix – Country-specific SAM multiplier model results of the short-run economic costs of COVID 19

Bangladesh



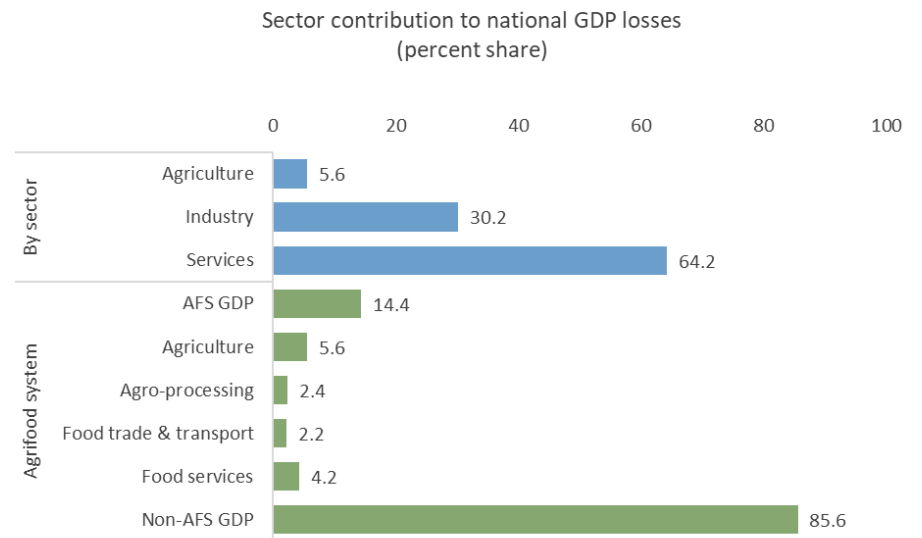
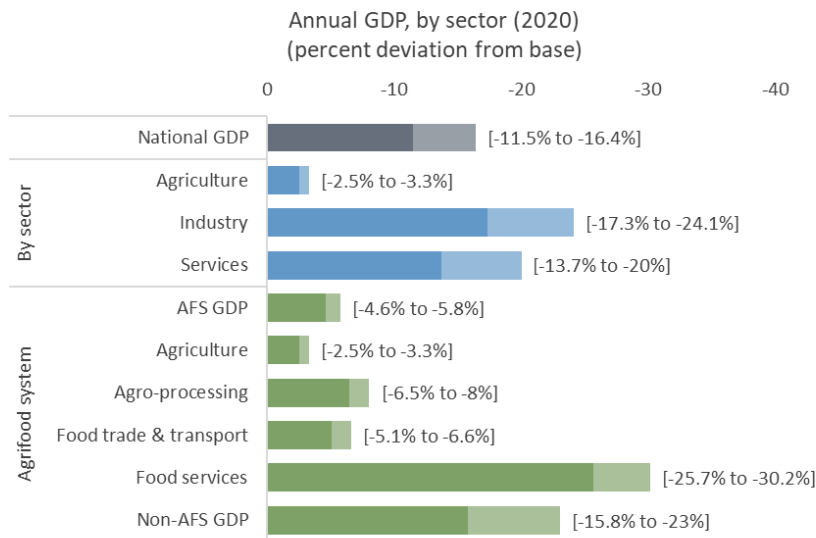
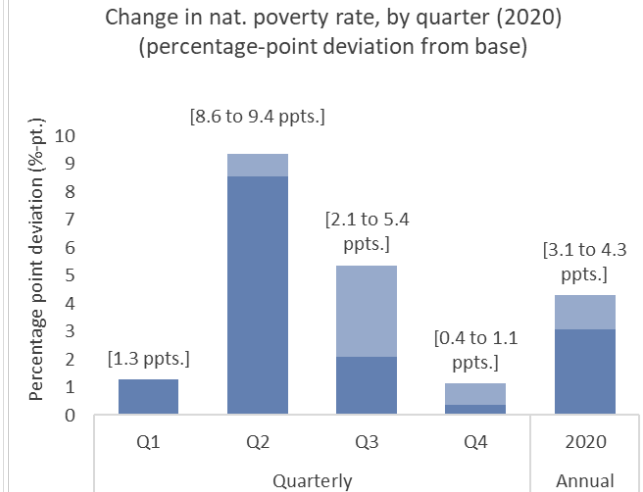
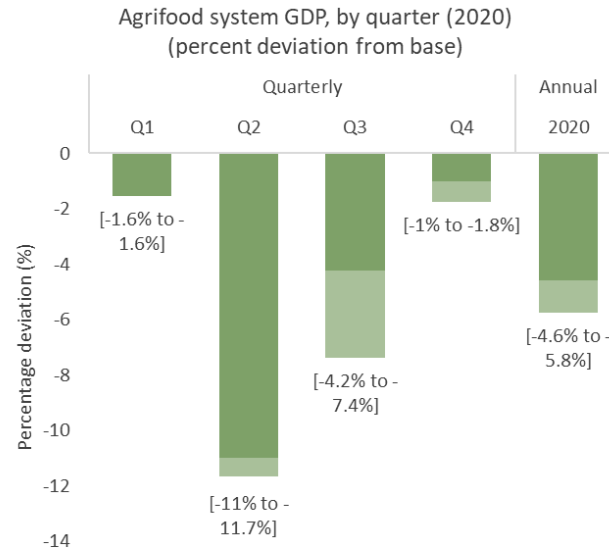
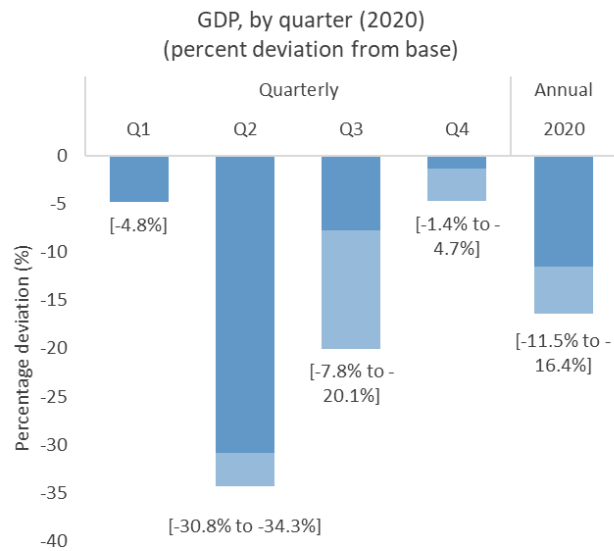
Source: Dorosh et al. (2020).

Cambodia



Source: Pradesha, Oum, and Diao (2021).

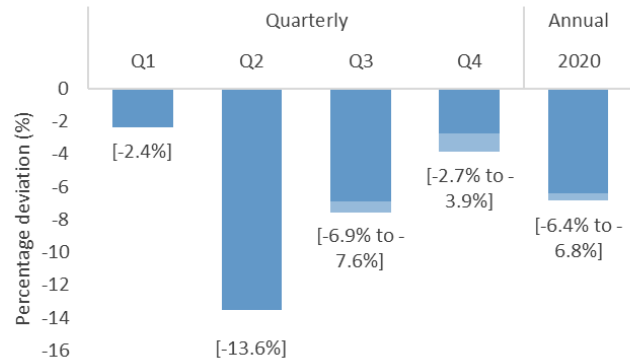
Democratic Republic of the Congo (DRC)



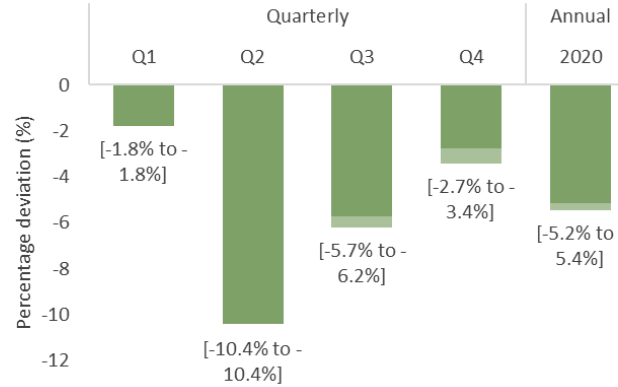
Source: Pauw, Randriamamonjy et al. (2021).

Ethiopia

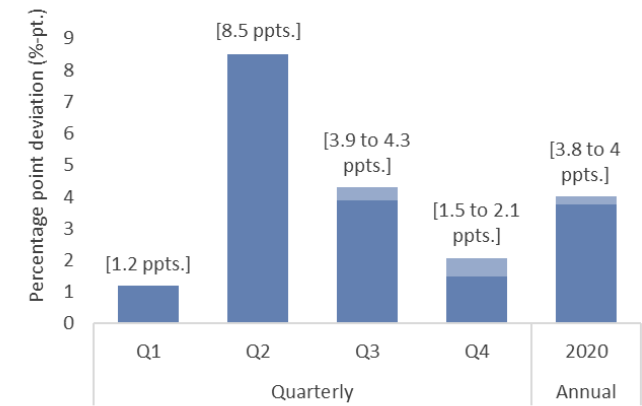
GDP, by quarter (2020)
(percent deviation from base)



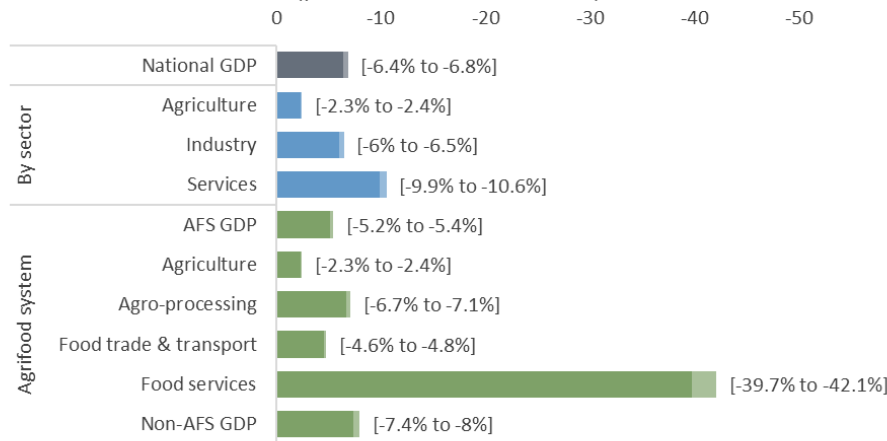
Agrifood system GDP, by quarter (2020)
(percent deviation from base)



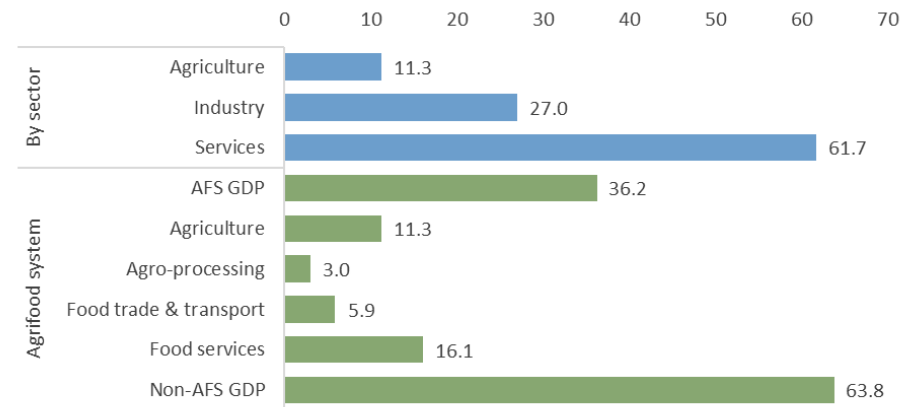
Change in nat. poverty rate, by quarter (2020)
(percentage-point deviation from base)



Annual GDP, by sector (2020)
(percent deviation from base)



Sector contribution to national GDP losses
(percent share)

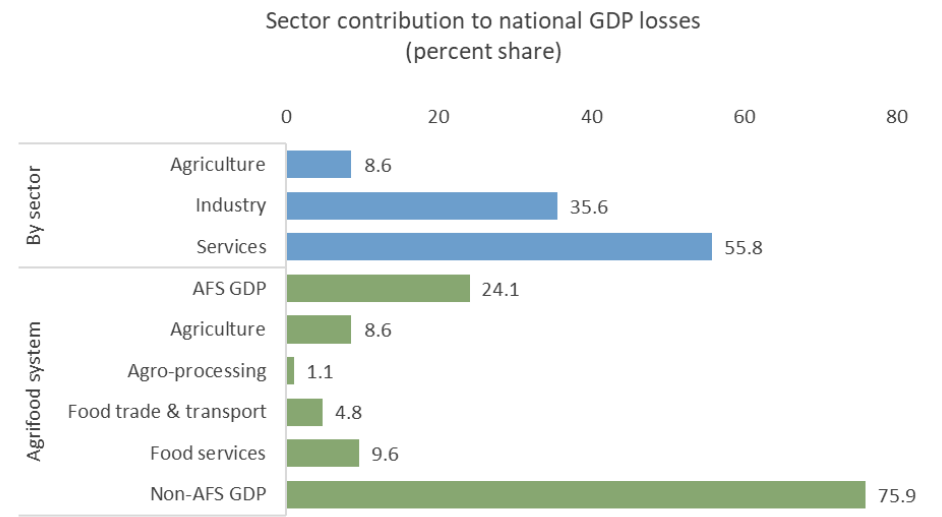
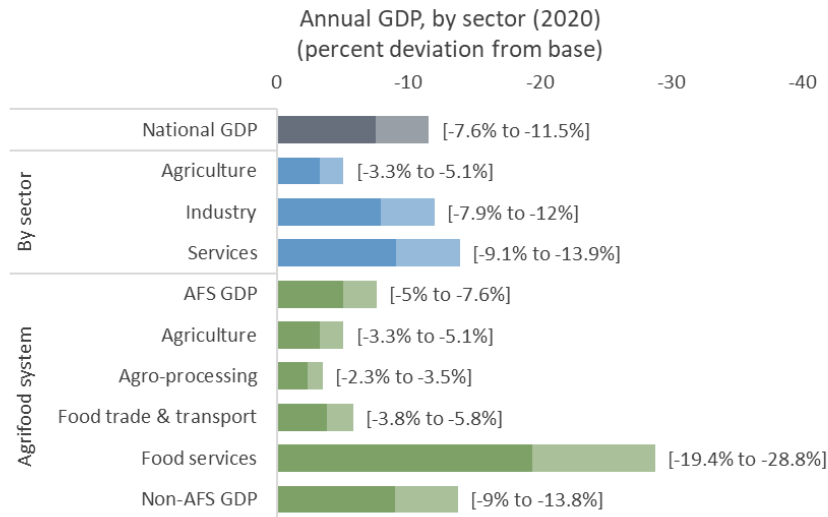
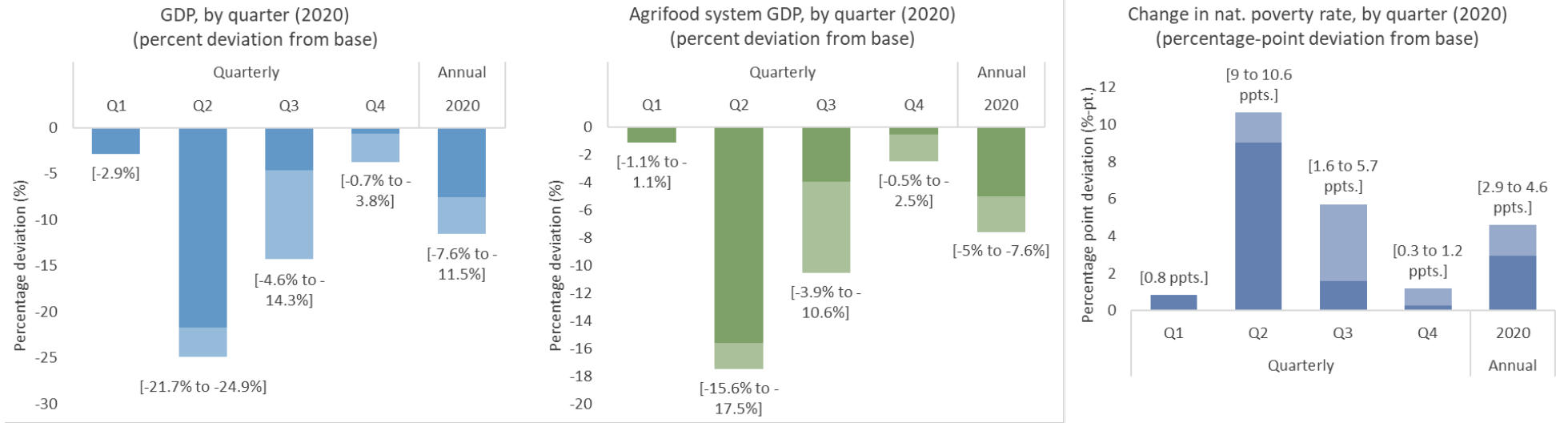


* Range under slower and faster recovery scenarios

* Average across slower and faster recovery scenarios

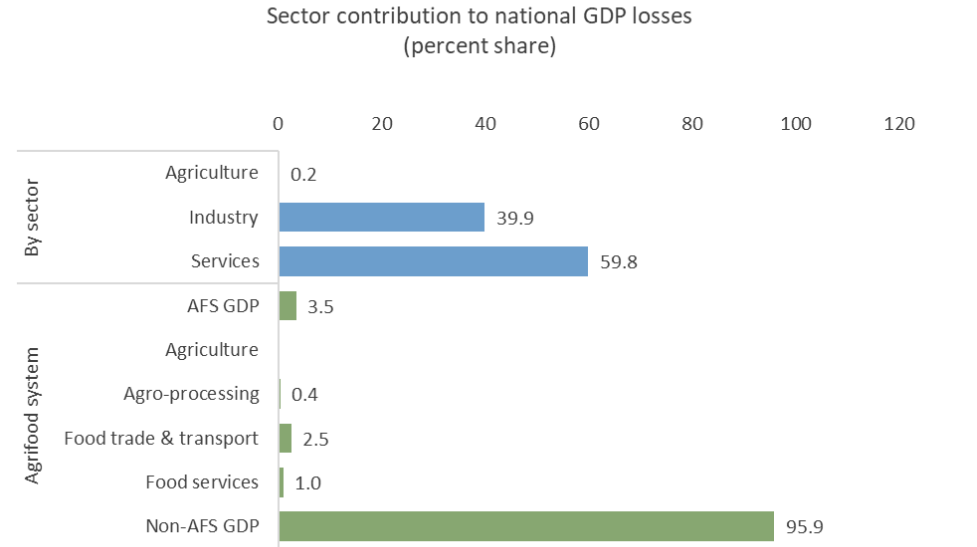
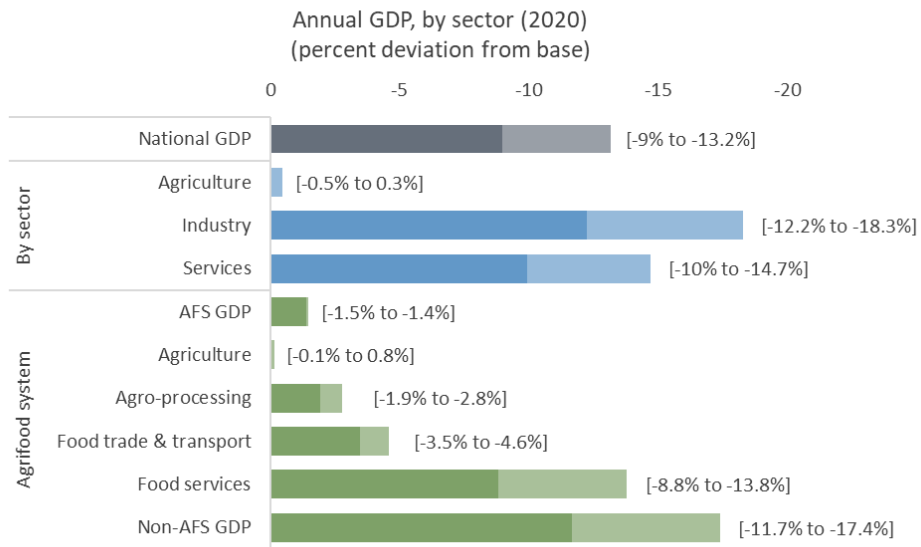
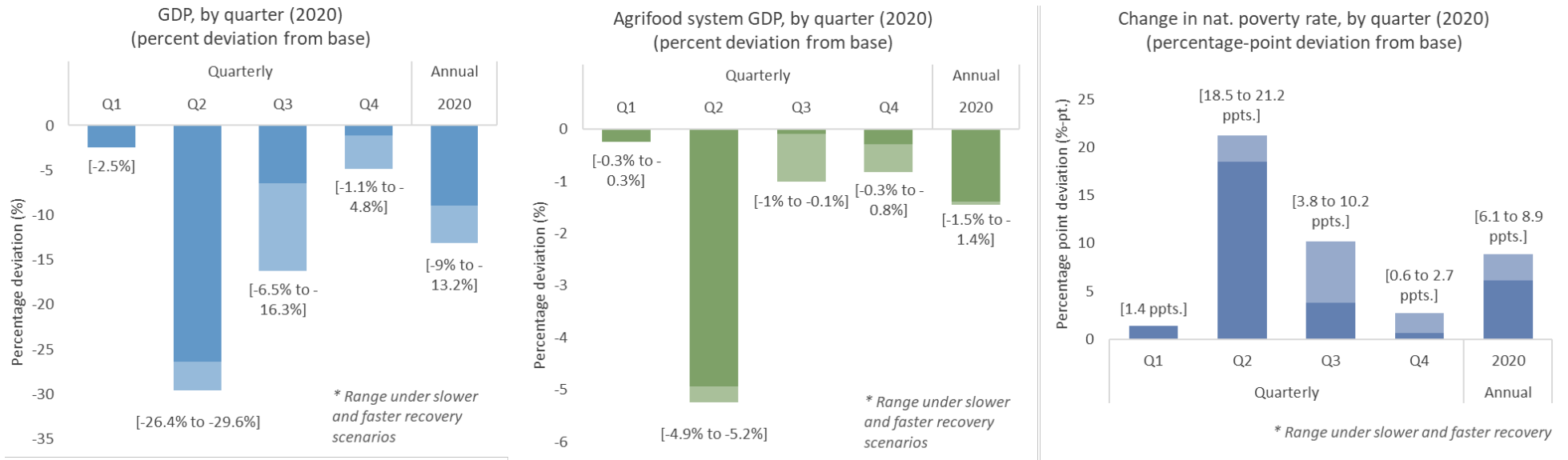
Source: Aragie, Taffesse, and Thurlow (2021).

Ghana



Source: Amewu et al. (2020)

India

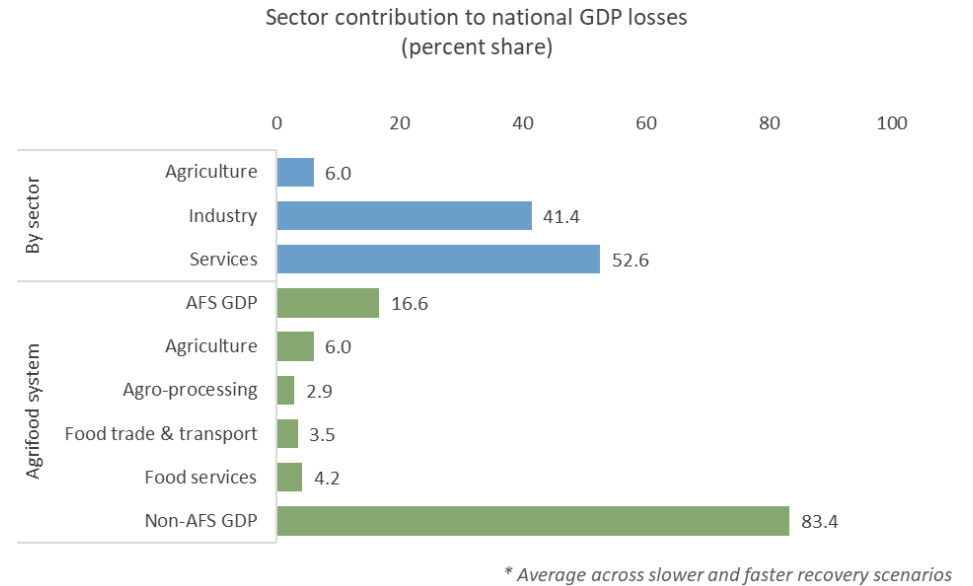
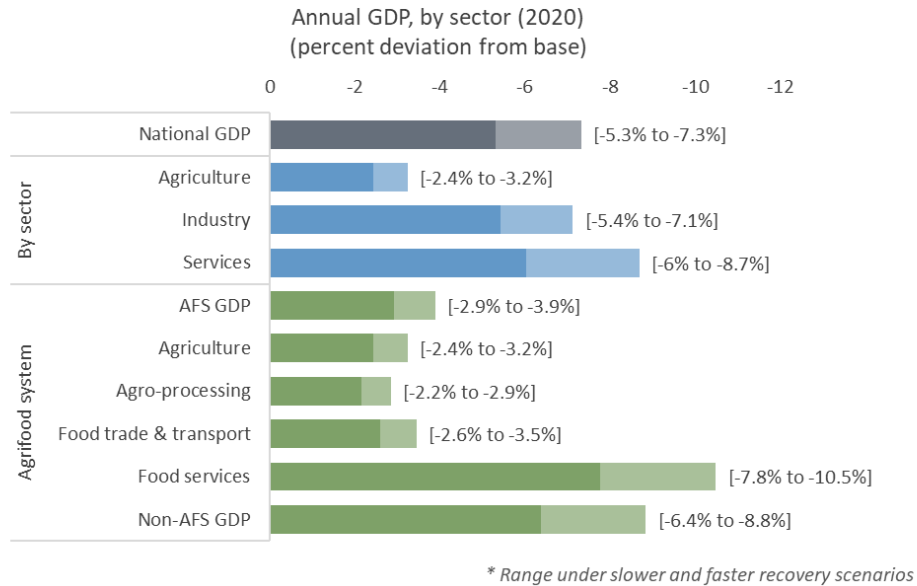
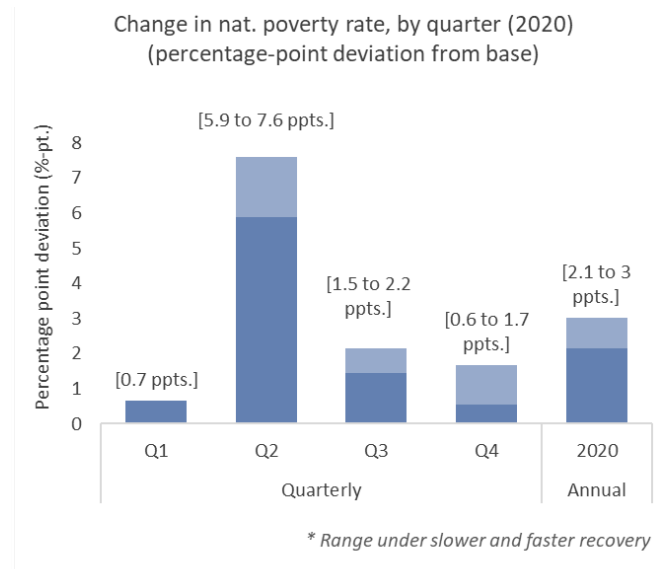
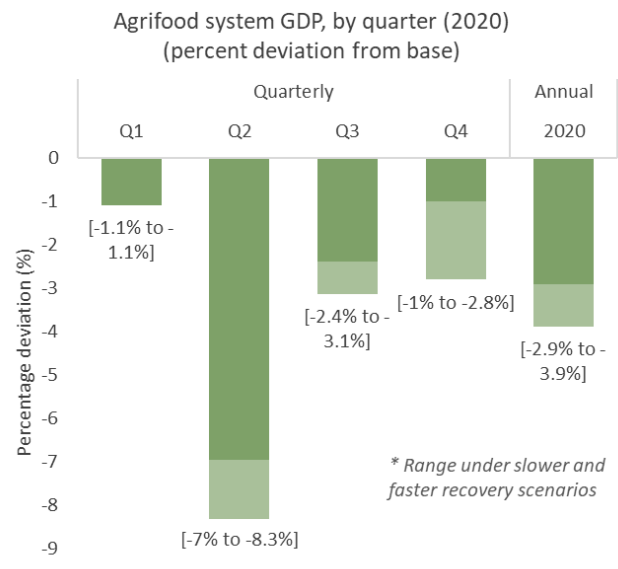
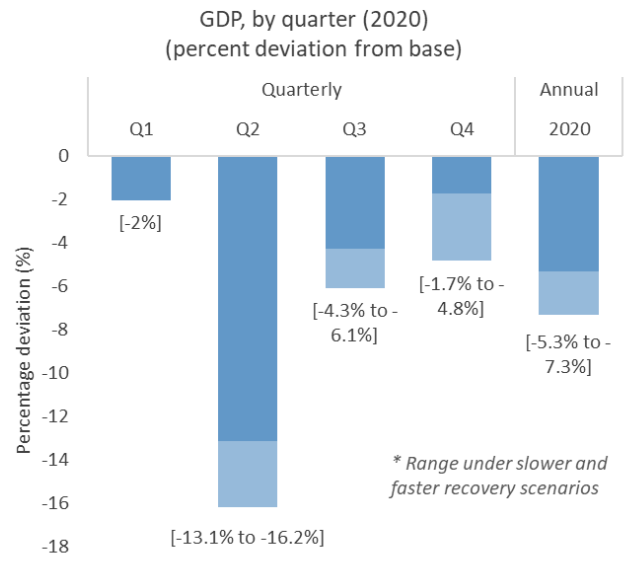


* Range under slower and faster recovery scenarios

* Average across slower and faster recovery scenarios

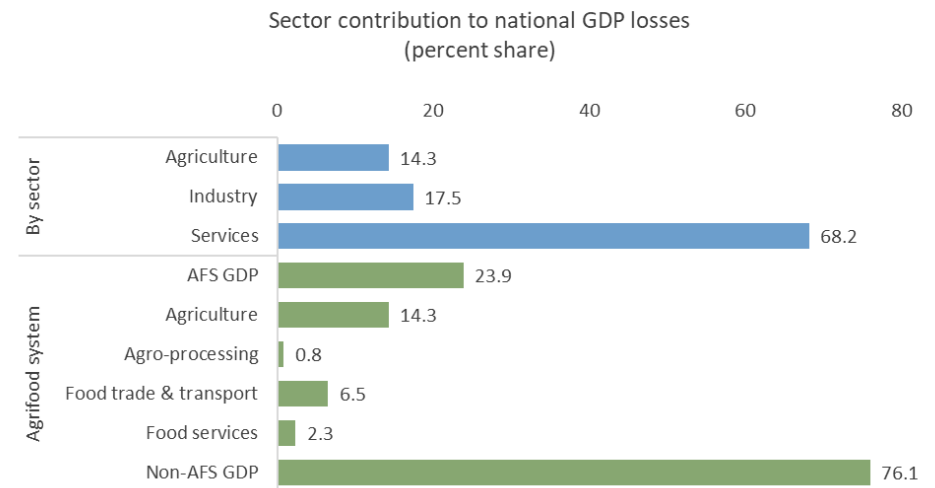
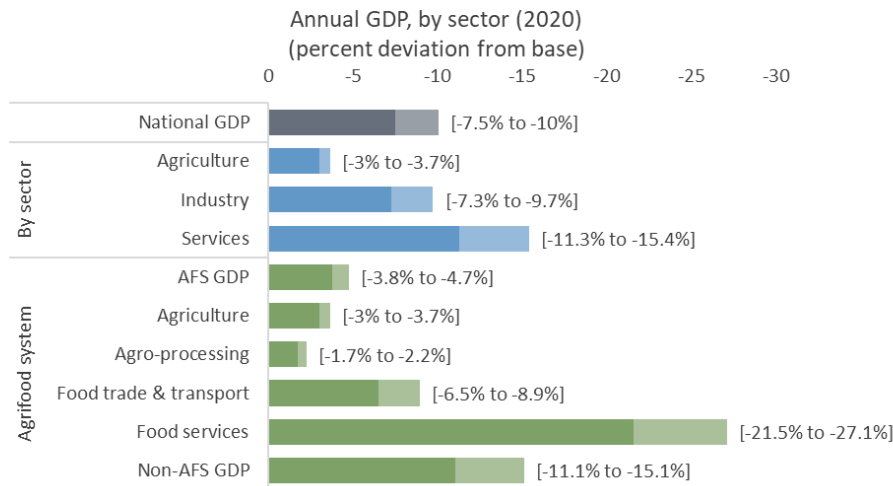
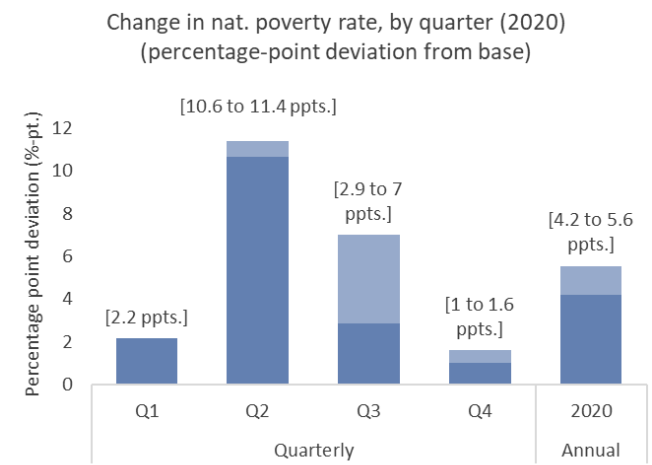
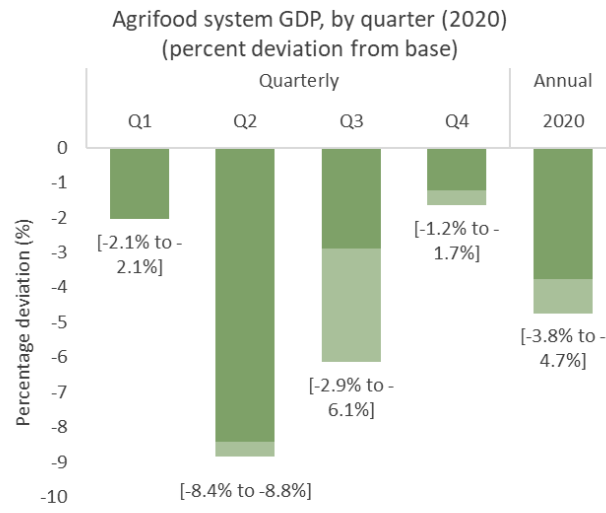
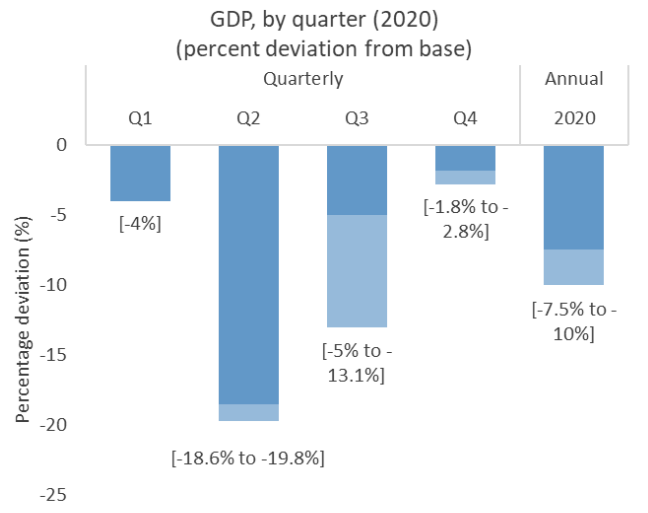
Source: Deb, Pradesha, and Thurlow (2020).

Indonesia



Source: Pradesha et al. (2020).

Kenya



Source: Thurlow, J. (unpublished).

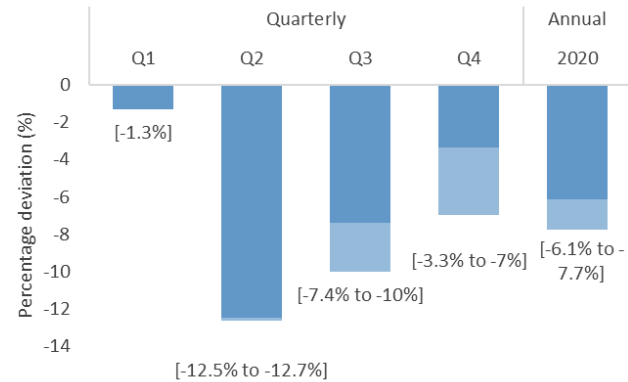
Mali



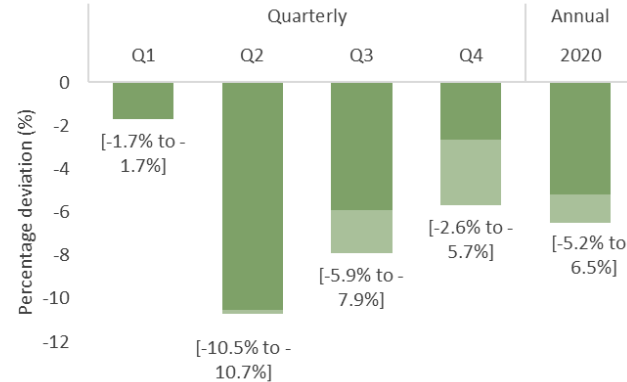
Source: Koné et al. (2020).

Malawi

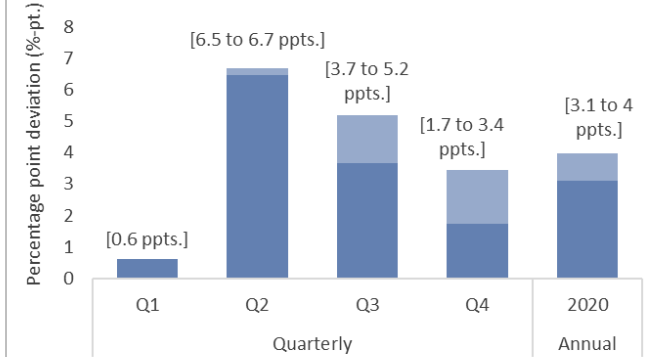
GDP, by quarter (2020)
(percent deviation from base)



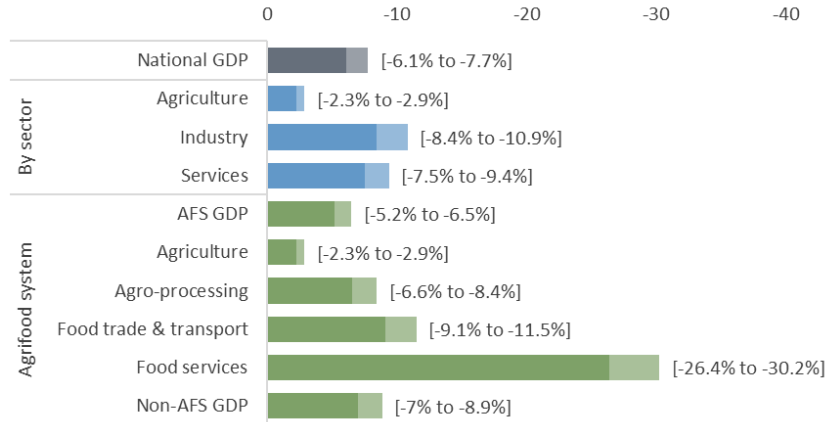
Agrifood system GDP, by quarter (2020)
(percent deviation from base)



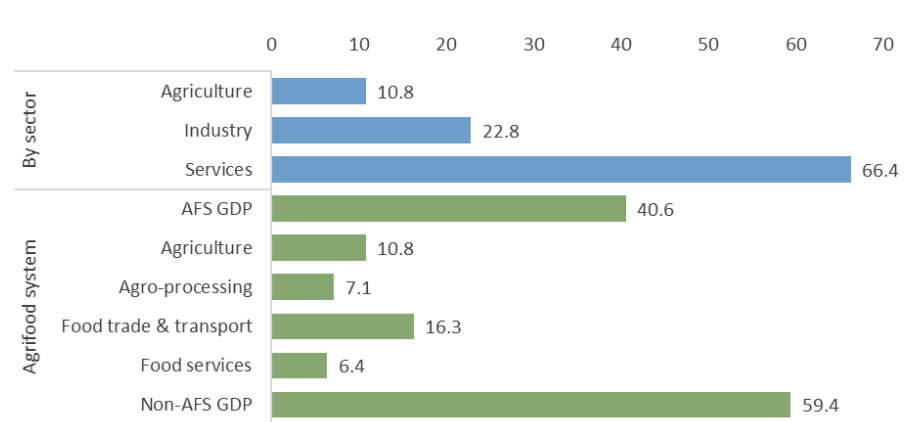
Change in nat. poverty rate, by quarter (2020)
(percentage-point deviation from base)



Annual GDP, by sector (2020)
(percent deviation from base)



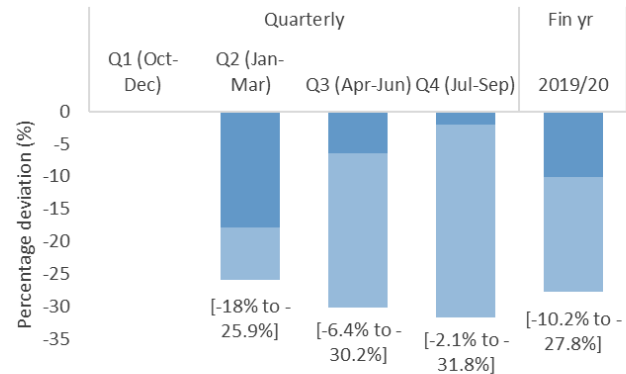
Sector contribution to national GDP losses
(percent share)



Source: Baulch, Botha, and Paw (2021).

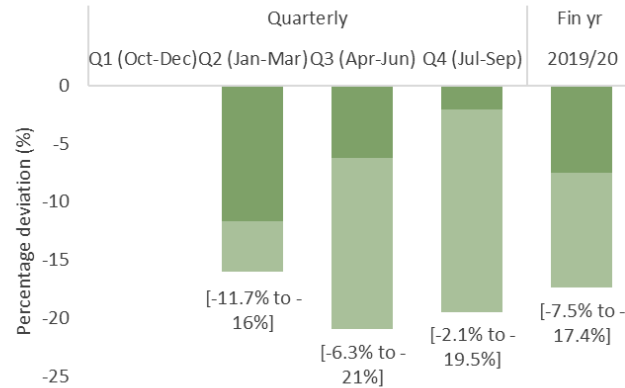
Myanmar

GDP, by quarter (2019/20)
(percent deviation from base)



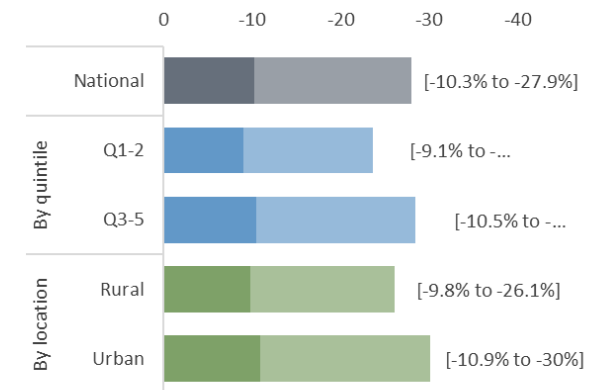
* Range under slower and faster recovery scenarios

Agrifood system GDP, by quarter (2019/20)
(percent deviation from base)



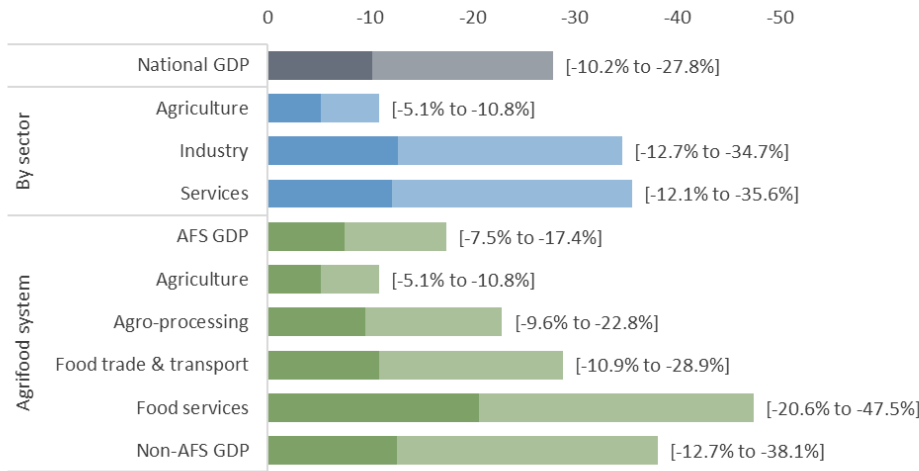
* Range under slower and faster recovery scenarios

Annual household income changes (2019/20)
(percent deviation from base)



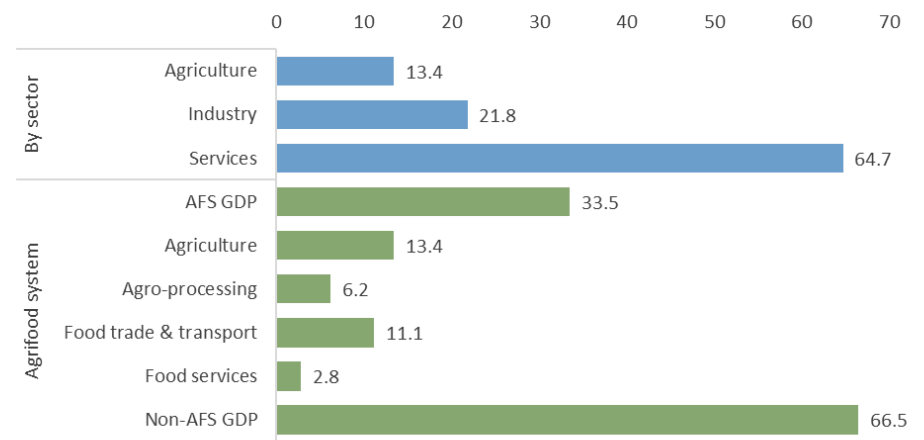
* Range under slower and faster recovery scenarios

Annual GDP, by sector (2019/20)
(percent deviation from base)



* Range under slower and faster recovery scenarios

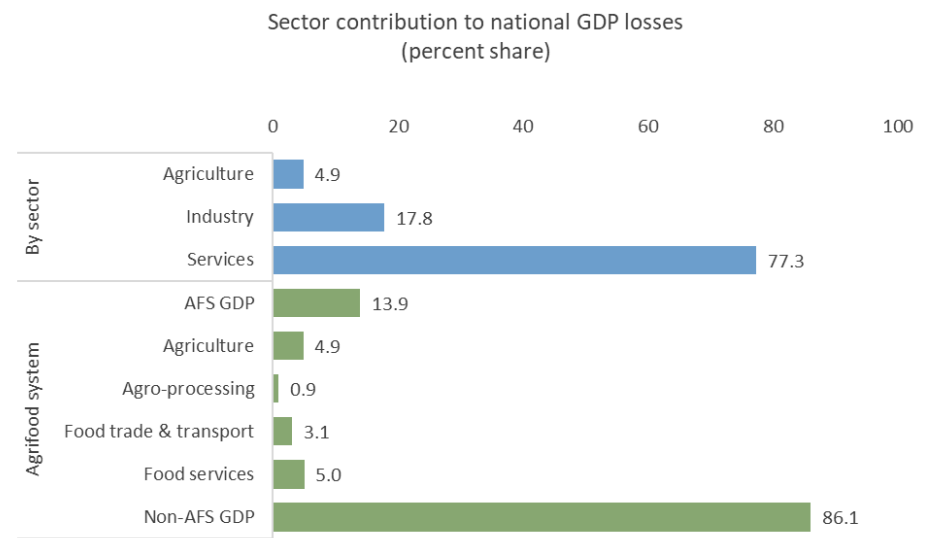
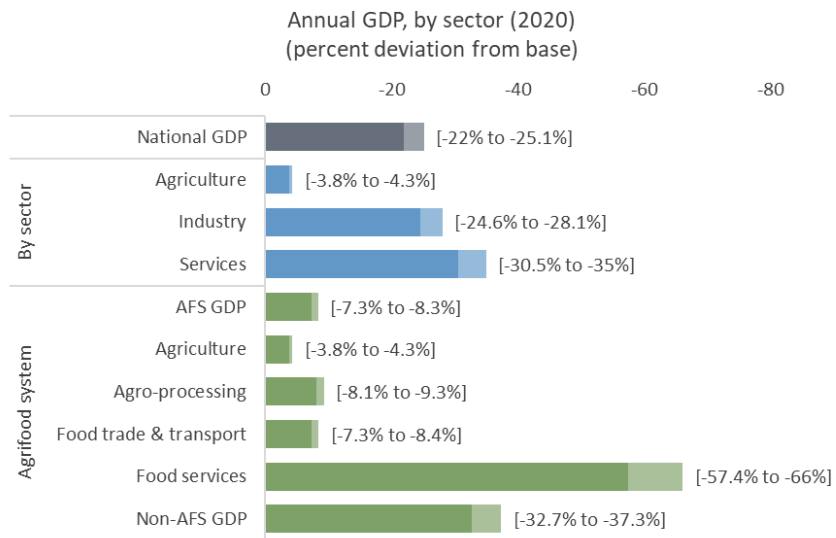
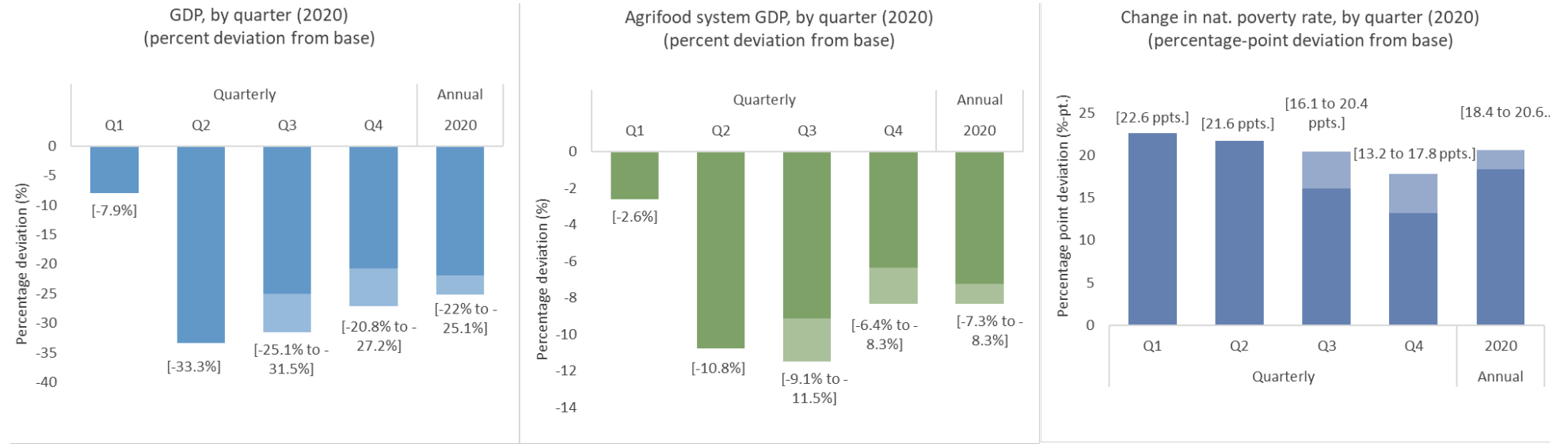
Sector contribution to national GDP losses
(percent share)



* Average across slower and faster recovery scenarios

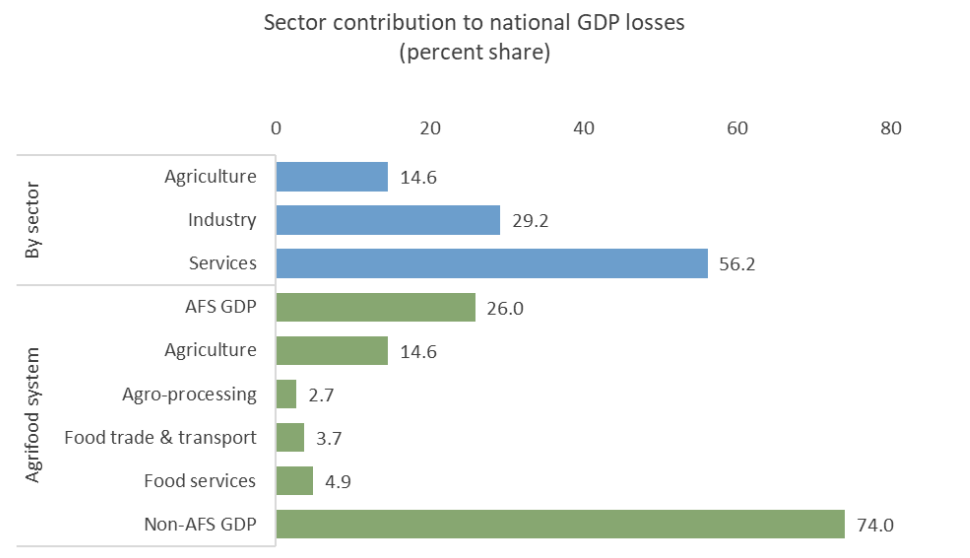
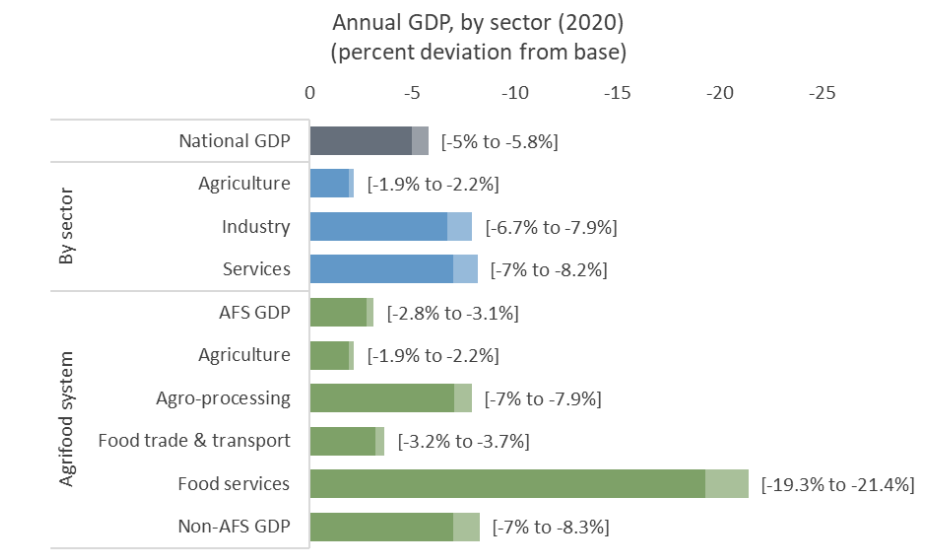
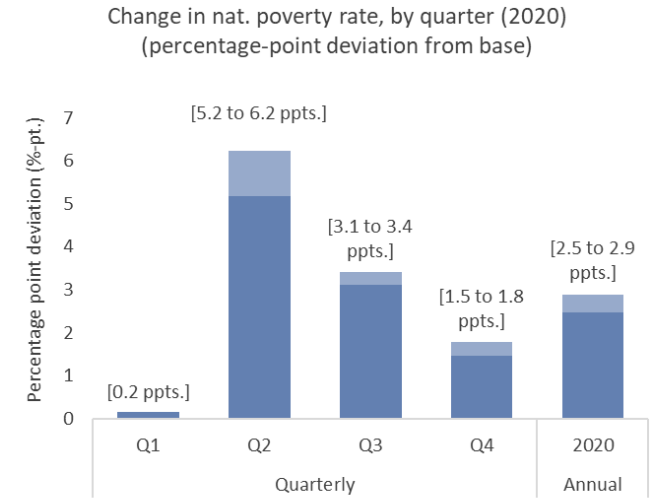
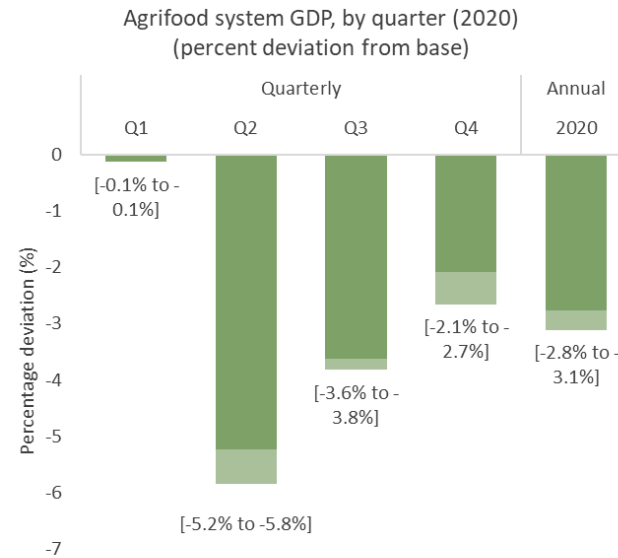
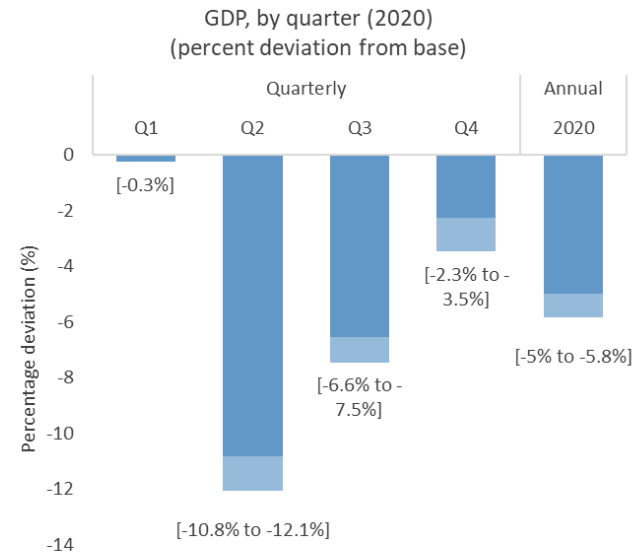
Source: Diao et al. (2020).

Nepal



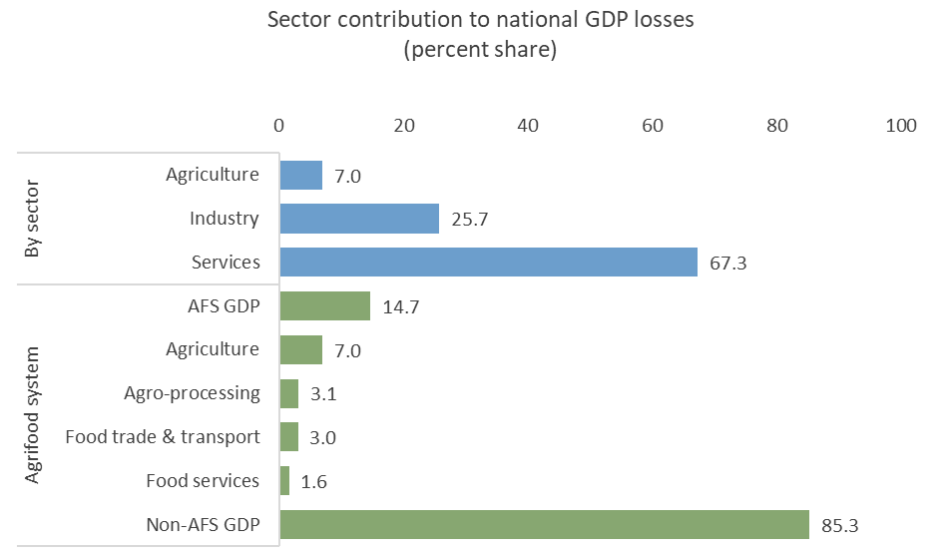
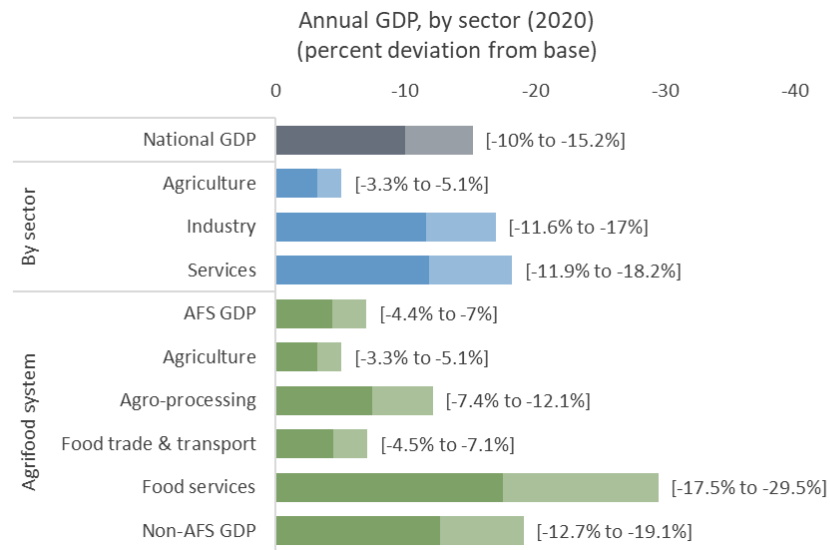
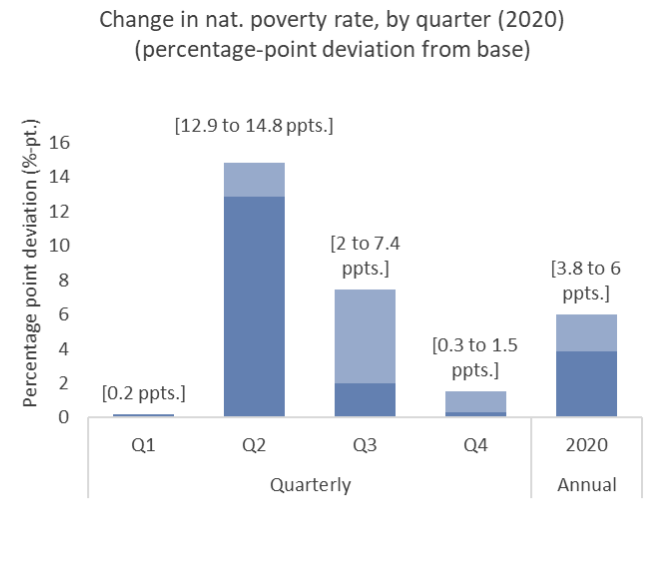
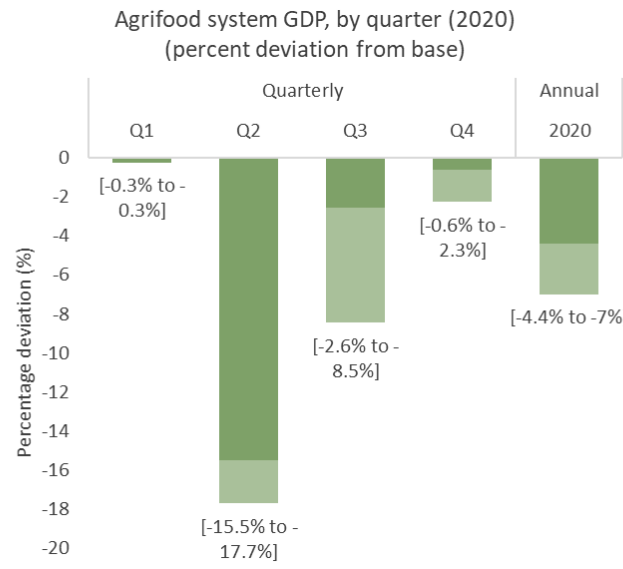
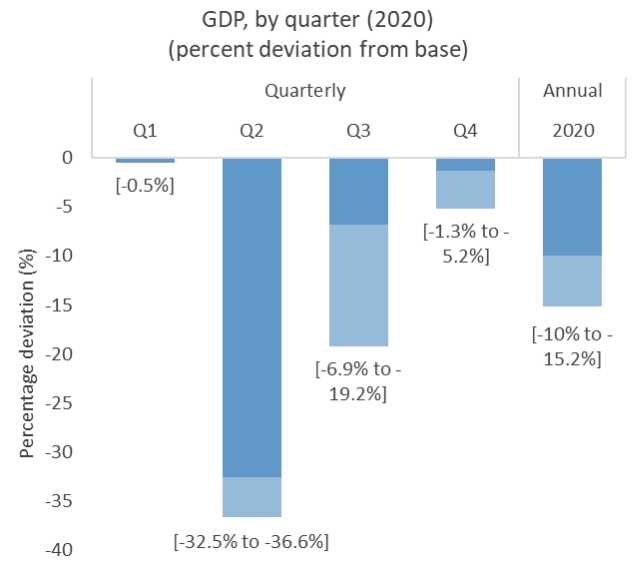
Source: Pradesha, Thapa-Parajuli, and Diao (2021).

Niger



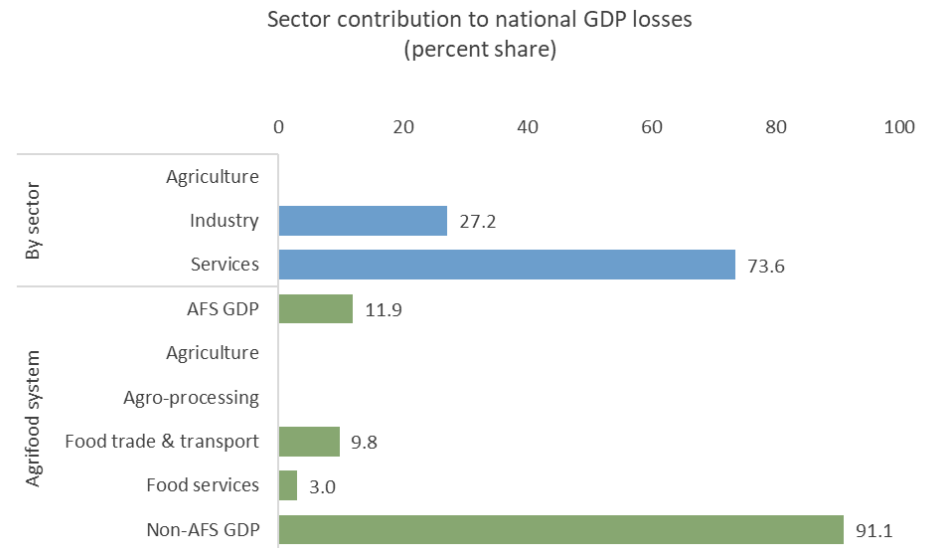
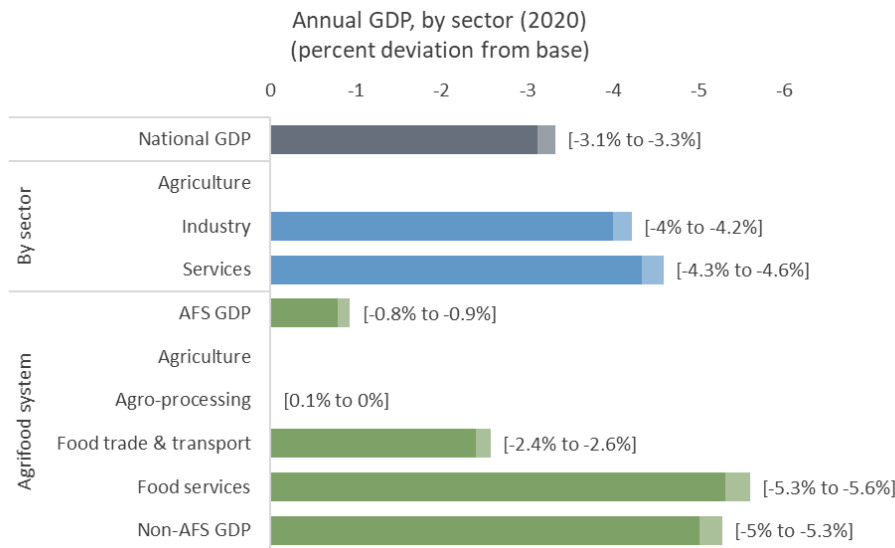
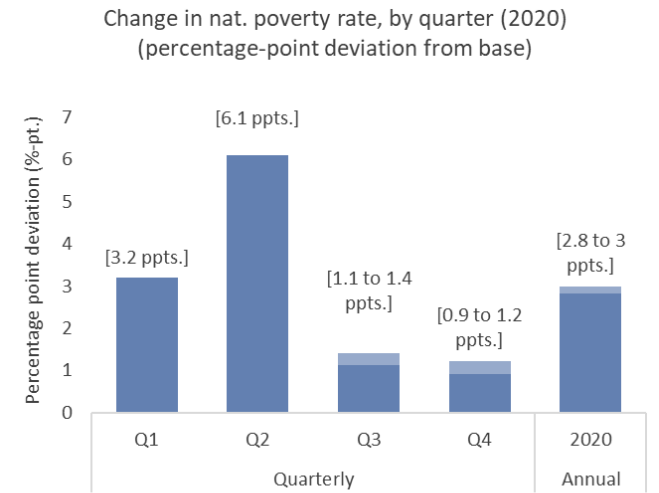
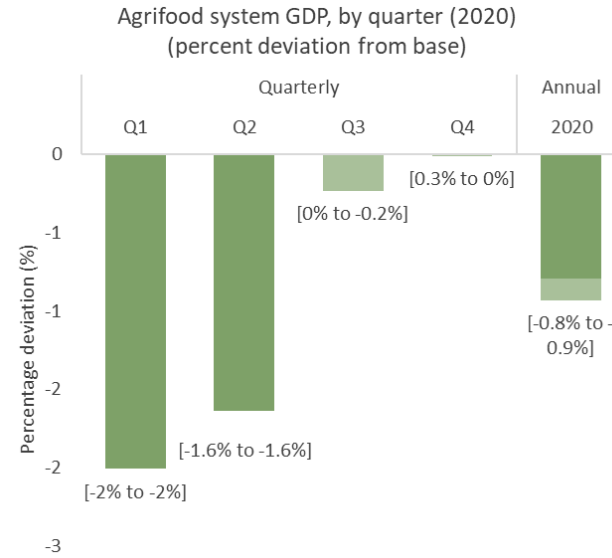
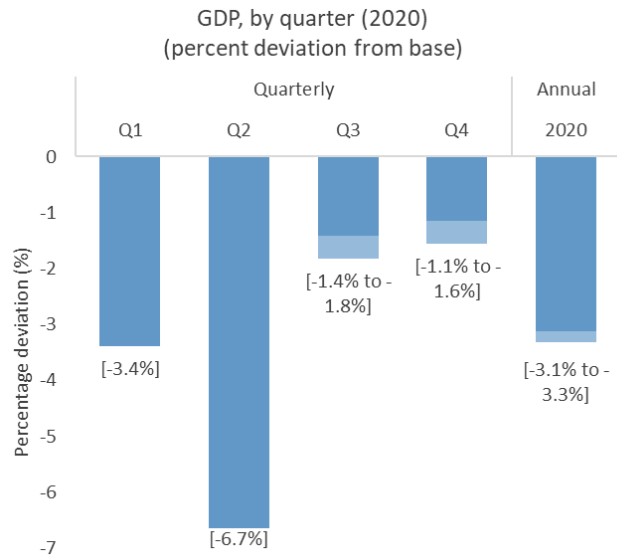
Source: Pauw, Randriamamonjy et al. (2020).

Nigeria



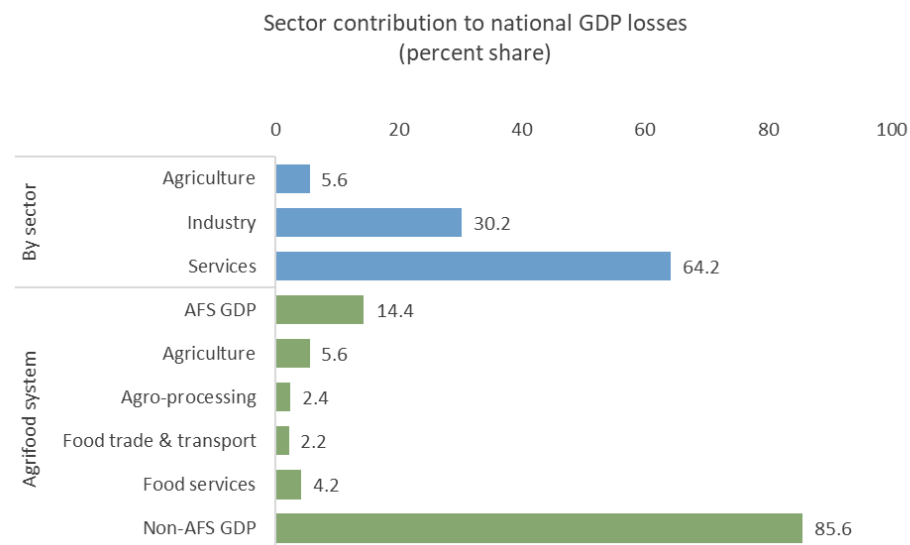
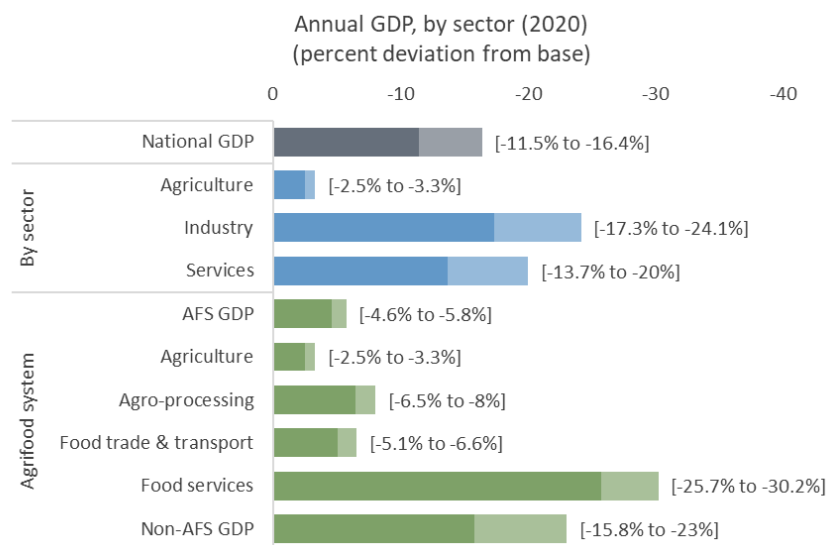
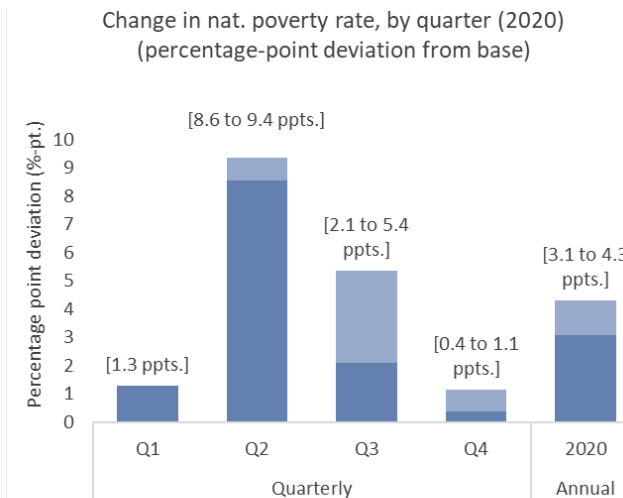
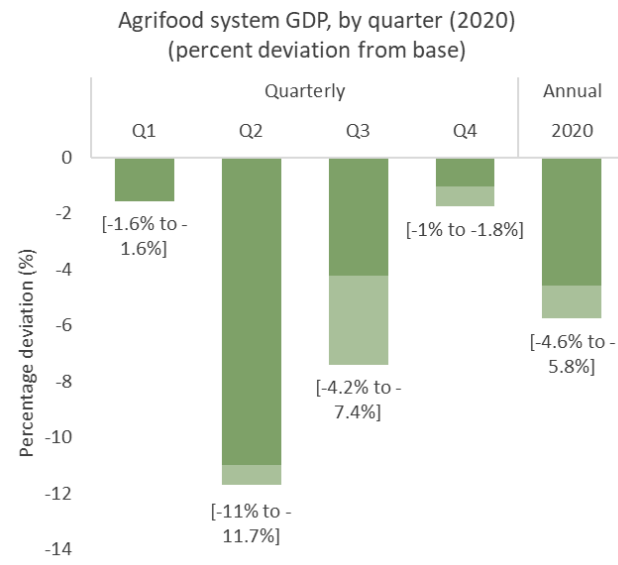
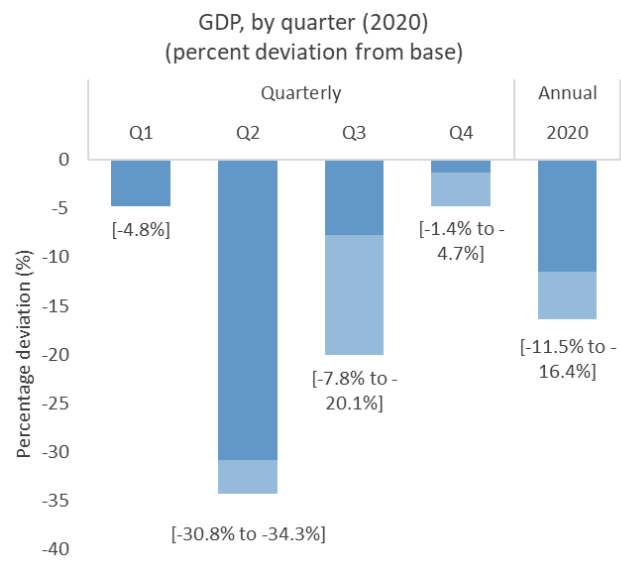
Source: Andam et al. (2020).

Pakistan



Source: Moeen et al. (2020).

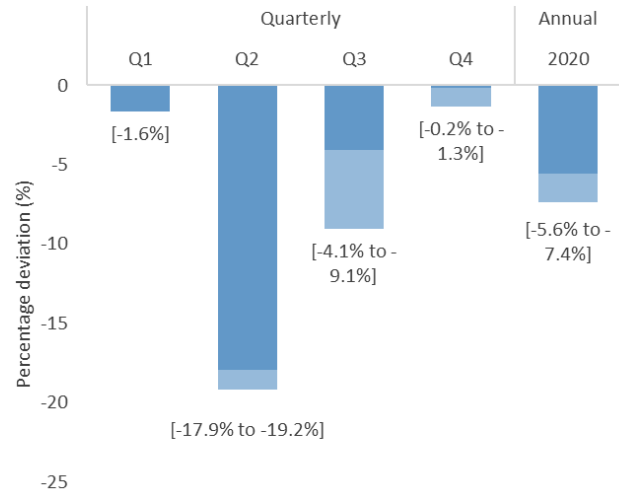
Rwanda



Source: Aragie, Diao et al. (2021).

Senegal

GDP, by quarter (2020)
(percent deviation from base)



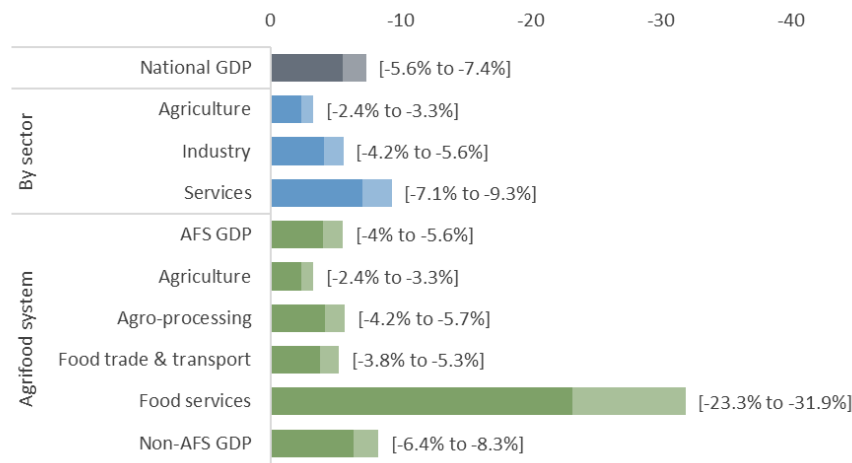
Agrifood system GDP, by quarter (2020)
(percent deviation from base)



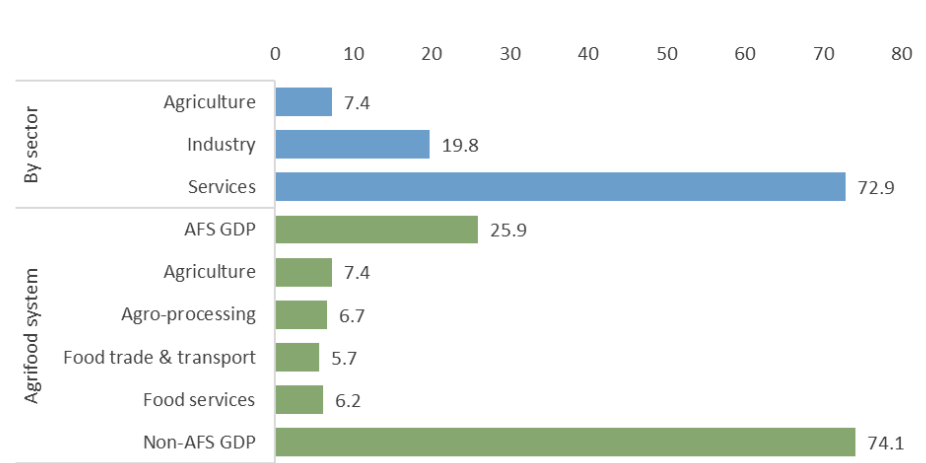
Change in nat. poverty rate, by quarter (2020)
(percentage-point deviation from base)



Annual GDP, by sector (2020)
(percent deviation from base)

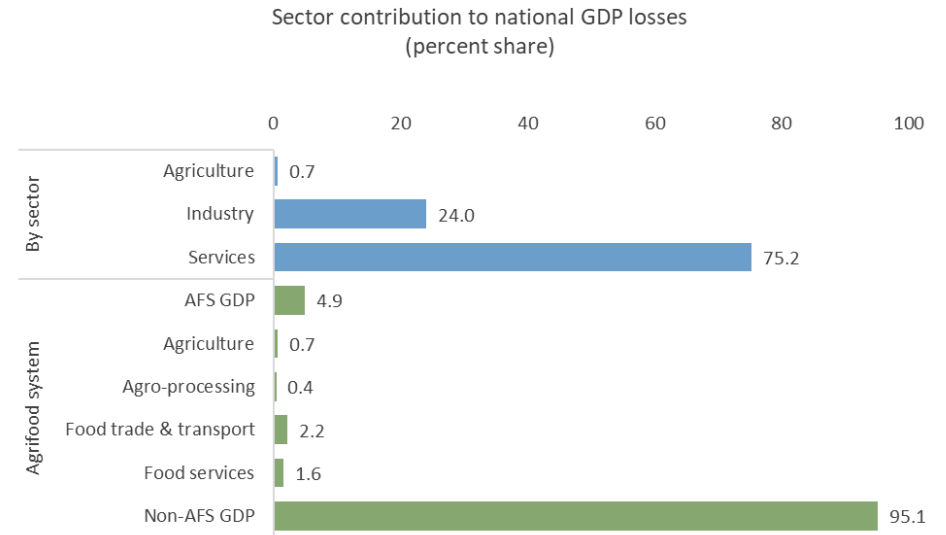
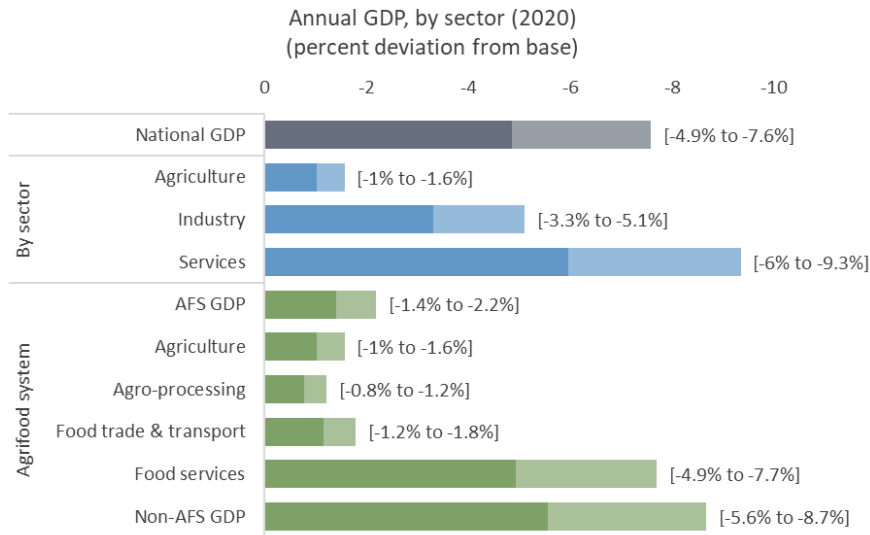
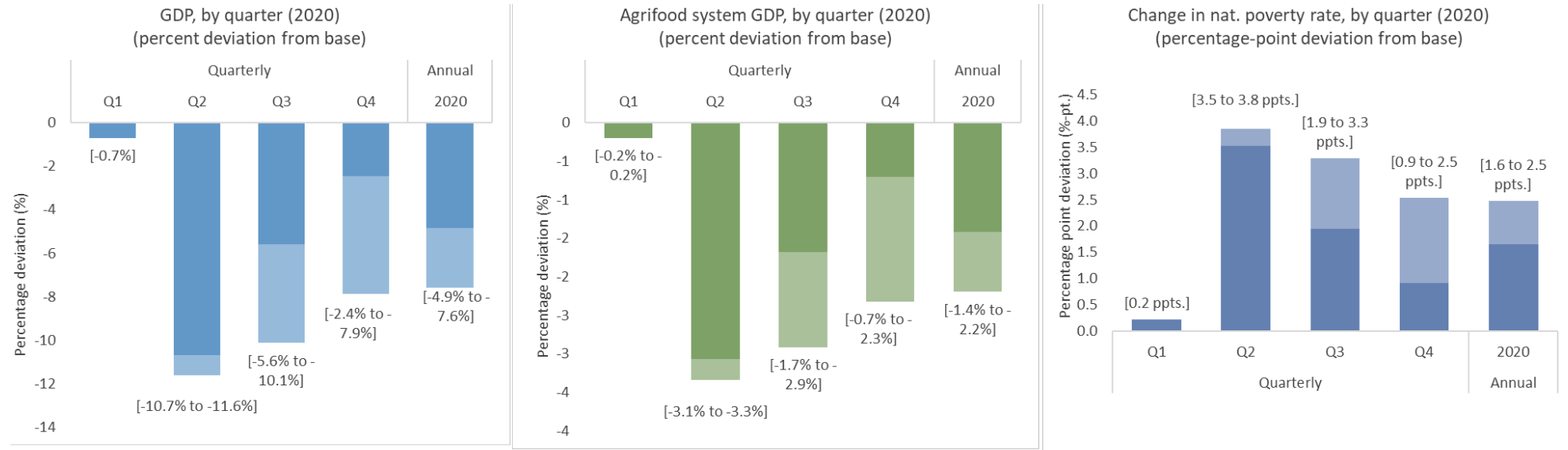


Sector contribution to national GDP losses
(percent share)



Source: Fall et al. (2020).

Zambia



Source: Pauw, Tembo, and Thurlow (2021).

ABOUT THE AUTHORS

Karl Pauw and **James Thurlow** are Senior Research Fellows in the Development Strategy and Governance Division (DSDG) of the International Food Policy Research Institute (IFPRI) and co-lead the country modeling team. **Jenny Smart** is a Senior Program Manager in DSGD, serving as flagship manager for the CGIAR collaborative research program on Policies, Institutions and Markets (PIM) and as project manager for the country modeling team.

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