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How could the covid-19 pandemic impact the economy of Burkina Faso?

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Abstract

Like other countries, Burkina Faso is affected by the spread of the coronavirus disease (Covid-19). This study analyzes the impact of the Covid-19 pandemic on Burkina Faso's economy. For this purpose, we have made use of a single country's computable general equilibrium model and formulated two alternative scenarios based on the likely duration of the pandemic. In the first scenario, we assume that the pandemic will last three (3) months, while in the second scenario, it spreads over six (6) months. The results indicate significant impacts on both macroeconomic and sectoral level and on households' well-being. First, economic growth could drop from 5.7 percent in 2019 to a range between +1.38 percent and -1.75 percent in 2020. Moreover, the unemployment is expected to grow (between +1.93 percent and +5.92 percent) because of a sharp drop in sectoral productions (ranging from -3 percent to -12 percent). In addition, our findings reveal a contraction of sectoral exports by -6 percent for extraction products (especially gold) to -16 percent for agricultural products (especially the cotton). Finally, the rise of consumer prices and growing unemployment will greatly dampen the purchasing power of households for all socio-professional categories.

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1. Introduction

Since December 2019, the world is facing a health crisis linked to the coronavirus (Covid-19). Although African countries being among the last ones to be affected are facing a collective threat to human life, social cohesion, and an economic disaster. These countries are characterized by a very inefficient health system and by fragile institutions.

Several reports (ECA 2020, IMF 2020, World Bank 2020) conclude that the spread of the coronavirus will seriously dampen African economies. According to the Economic Commission for Africa (ECA 2020), the continent's economic growth rate could contract sharply. The reports by the International Monetary Funds (IMF 2020) and the World Bank (World Bank 2020) anticipate an economic recession ranging from -2.1 percent and -5.1 percent mainly due to the negative impact of the pandemic on the world trade and its impact on African economies. On July 12, 2020, more than 12 million of individuals were affected by the Coronavirus disease (Covid-19) at the world level, including 1020 confirmed cases in Burkina Faso, making this country one of the least affected in Sub-Saharan Africa. Projections made by the national health authorities predict a peak of more than 7000 cases in the coming weeks.

Countries could be affected by the spread of the coronavirus disease (Covid-19). Authors such as Hausmann (2020) conclude that negative supply shocks can occur with the spread of Covid-19. First, production capacity is reduced when workers are infected. For instance, Atkeson (2020) has shown that when population is infected, severe staffing shortages can affect financial and economic infrastructure. Second, the pandemic of Covid-19 can force both the sick workers and their caregivers to be absent from work or to be less efficient, which hurts productivity. Indeed, to dampen the spread of the coronavirus (Covid-19), several countries have adopted measures such as closure of the air, land and rail borders, the shutdown of schools and universities, production units and services (markets, drinking places, urban and interurban transport services). These policies can exacerbate economic recession (Eichenbaum et al. 2020, Inoue and Todo 2020).

Similarly, Burkina's economy could be negatively affected by the spread of Covid-19. To limit the spread of Covid-19, the government has promptly adopted several measures, including the closure of the air, land and rail borders, the shutdown of schools and universities, production units and services (markets, drinking places, urban and interurban transport services), the ban on gatherings of more than 50 people, etc. These measures aiming at limiting the spread of the virus would undoubtedly decrease activities in all economic sectors (Agriculture, Industry, Services) of the economy.

This paper's objective is to analyze the impacts of the covid-19 on Burkina Faso's economy. It contributes to the existing literature on modeling of the pandemics. While previous studies investigating the economic effects of pandemics have been widely applied to developed countries (Smith et al. 2009, Dixon et al. 2010, Keogh-Brown et al. 2010, Verikios et al. 2012, Prager et al. 2017), this study focuses on Burkina Faso which is a small, natural resources exporting developing country. For this purpose, we use a simulation model (a single country's computable general equilibrium model) and data representing the structure of Burkina Faso's economy (a social accounting matrix). The model's main advantage is its ability to adequately represent sectoral and institutional linkages, as well as trade relations between Burkina Faso and the rest of the world. This methodological framework is fundamental insofar as the effects of the pandemic may not only affect the national economy but the world economy as well.

The hypotheses on which the study is based on are both the time necessary to contain the pandemic followed by a resumption of economic activities and to the impact on international trade of the products which Burkina Faso is an exporter. Given uncertainty over the duration of the pandemic, two alternative hypotheses (scenarios) have been formulated: i) an optimistic scenario which assumes that the pandemic will be under control after 3 months and while world demand for Burkina Faso's products will contract by 10 percent; and ii) a pessimistic scenario stating that the pandemic extends over 6 months with a 20 percent drop in world demand for Burkina Faso's exports.

The rest of the paper is structured as follows: After presenting the methodological framework and simulations (section 2), we present the results (section 3) before concluding and providing recommendations for the economic recovery of Burkina Faso (section 4).

2. The CGE model

Several authors have analyzed the economic effects of pandemics. They have used either single-sector models (Fan 2003, Jonung and Roeger 2006) or multi-sector computable general equilibrium models (Smith et al. 2009, Dixon et al. 2010, Keogh-Brown et al. 2010, Verikios et al. 2012, Prager et al. 2017).

While the former have the advantage of taking into account the short nature of pandemics (they are generally quarterly models), they have the disadvantage of having a single-sectoral approach which can lead to ignore some sectors particularly relevant when studying the economic effects of pandemics. The latter (Verikios et al. 2012) have the advantage of considering all sectors of the economy, but unfortunately have also the disadvantage of having an annual periodicity, leading to not accurately capture the short nature of the pandemics.

Alongside Verikios et al. (2012), we believe that the CGE models are more suitable for studying the impact of the pandemic on a small economy (Burkina Faso). Indeed, on the one hand, many productive sectors (Agriculture, Industry and Services) can be potentially affected by the Covid-9 pandemic . On the other hand, the effects of the Covid-19 pandemic on the world economy can have repercussions on the economy of Burkina Faso through, for instance, international trade. The CGE models allow considering a larger set of channels through which Burkina Faso's economy can be affected by the pandemic of Covid-19.

The CGE model used is based on the PEP-1-t model developed by Decaluwé et al. (2010). It is a dynamic recursive model that implements the interaction between the different consumption and production behaviors while ensuring macroeconomic balances. It has been slightly modified to account for some of the key characteristics of Burkina Faso's economy. First, the households have been discriminated according to socioprofessional occupation. Second, we consider an imperfect mobility of the capital between sectors rather than sector specificity of capital.

2.1. The General characteristics

The firms are expected to operate in perfectly competitive markets. Thus, the representative firm maximizes the profits subject to its production technology while considering the prices of goods, services and factors as given (price-taker behavior).

Once the level of production has been determined, it is assumed that this output is sold on both domestic and foreign markets, based on a CET (constant elasticity of transformation) function that allows for imperfect substitutability between goods produced for different markets.

Similarly, a standard CES (constant elasticity of substitution) function – also known as an Armington function – governs the consumption choices for products according to their origin (local or imported).

The model also integrates four categories of agents: households, government, firms, and the rest of the world. Households derive their income from remunerative factors (labor, capital, and agricultural land) and from net revenue transfer. Their expenditures consist of consumption spending and direct tax payments to the government. The difference between income and expenses represents household savings. The government collects direct and indirect taxes and makes current expenditures, transfers to other institutions, and public investments. The firms receive a portion of capital income, pay dividends to households and foreign countries, pay income taxes to the government, and save the rest.

The assumption of a small country with fixed international prices is adopted. The exchange rate is the numeraire of the model. The balance between supply and demand in the goods and services market is ensured by an adjustment in relative prices. The total investment is the sum of the various economic agents' savings. The current account balance, stock variation, and government spending are exogenous and evolve at the same pace as the population growth.

The following closure rules were adopted: fixed foreign savings, fixed government savings (flexible taxation rates), and savings-driven investment.

The production function structure is represented in Figure 1. At the top level, there is a Leontief function that combines value added and an intermediate consumption aggregate. The two aggregate inputs are therefore considered to be strictly complementary, without any possibility of substitution. At the second level, the representative firm's value added consists of composite labor and composite capital, following a constant elasticity of substitution (CES) specification. At the bottom level, on the value-added side, two categories of labor (skilled, unskilled) are combined following a CES technique that reflects the imperfect substitutability between these types of labor. On the intermediate consumption side, aggregate intermediate consumption is made up of various goods and services. Intermediate inputs are therefore assumed to be perfectly complementary and are combined following a Leontief production function.

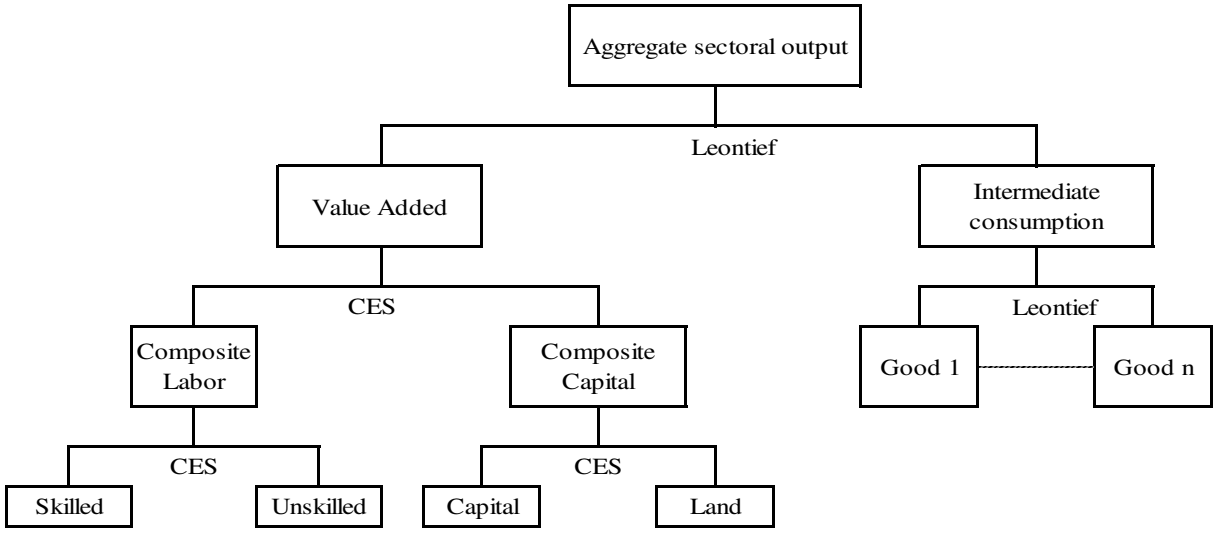

Figure 1. The structure of the production function

2.2. A capital market characterized by partial mobility

In the standard version of the model, capital is assumed to be sector specific. We relax this hypothesis in favor of partial mobility in which three aggregate sectors are distinguished: agriculture, industry, and services. Their mobility is partial in the sense that agricultural capital can be used alternatively for subsistence or cash-crop agriculture, for example. However, agricultural capital cannot migrate to nonagricultural sectors. Similarly, industrial capital can migrate between industrial subsectors but not to agriculture or to services. This modeling implies a rate of return on capital that is defined by the aggregate sectors of the economy and not by individual sectors. The closure of the capital market is modified accordingly. The conditions of capital market equilibrium now arise at the macrosectoral level:

in the agricultural sector: $\sum_{j1} KS_{k,j1,t} = \sum_{j} KD_{k,j1,t}$

in the industry sector: $\sum_{j2} KS_{k,j2,t} = \sum_{j} KD_{k,j2,t}$

in the services sector: $\sum_{j3} KS_{k,j3,t} = \sum_{j} KD_{k,j3,t}$

where *KS* and *KD* represent the supply and demand of capital, respectively, and j_1, j_2 and j_3 are the subsets of agriculture, industry, and services, respectively. These three equations determine the wage rates $R_{k,agsec,t}$ at the macrosectoral level.

3. The data

The social accounting matrix on which we based the analyses was developed in 2015 by the World Bank in collaboration with the National Institute of Statistics and Demography (INSD). It reflects the economic situation of Burkina Faso for the year 2012. This matrix includes 17 sectors of activity producing 17 goods and services with the possibility for a sector to produce more than one product and for one good to be produced by several activities.

Four production factors are identified: unskilled labor, skilled labor, land (used only in agriculture), and capital. The matrix includes nine household categories distinguished according to the main occupation of the head of the household: public employees, formal private sector employees, informal private sector employees, cash-crop farmers, subsistence farmers, breeders, fishers, self-employed, nonagricultural employers and the unemployed.

Table A.1 (Appendix) shows the structure of the Burkinabe economy in 2012 according to the social accounting matrix. Subsistence agriculture is the main contributor to value added, accounting for nearly 16 percent of the total. This sector is followed by public administration with 14.83 percent, livestock and hunting with 11.26 percent, mining with 10.80 percent and trade with 10.02 percent. Other industries, such as cash crops, construction, transport and communications, health and social services, each represent approximately 4 to 5 percent. Burkina Faso's main imports are industrial products, which include metal products, transport equipment, radio, television and communications equipment, among others. Almost 70 percent of the value of imports is made up of industrial products. Combined with the products from agroindustry, the share of imports of industrial products amounts to more than 90 percent.

Regarding exports, mining products, particularly gold, represent by far Burkina Faso's main source of export revenue (60.89 percent). Textiles, clothing and leatherwork are in second place, with 12.33 percent of export earnings. The country depends mainly on imports to the sectors of "other industries" and to a lesser extent on "financial activities" and the agroindustry, as shown by the import shares on domestic absorption. Almost all the production of the mining sectors is

exported (94.15 percent). The textile, clothing, and leatherworking sector exports nearly 60 percent of its production.

4. The COVID-19 scenarios

Previous studies analyzing the economic impacts of pandemics through CGE models have modeled them in various ways. More frequently, the pandemic is supposed to reduce participation in the labor market (due to illness and death), to increase medical expenses, and to lead to avoidance behavior (voluntary reduction in participation in productive work; reduction in attendance at educational institutions; reduction in travel (domestic and international) and leisure activities; reduction in the use of public transport). The fall in labour supply, whether voluntary or because of illness, is modeled as a productivity shock affecting the productive capacity in some sectors of the economy (Keogh-Brown et al. 2010). In addition to the supply (or productivity) shock, there are demand shocks, particularly for transport, education and leisure services (Prager et al. 2017).

In this paper, two alternative hypotheses (scenarios) have been formulated: i) an optimistic scenario which assumes that the pandemic will be under control after 3 months and while world demand for Burkina Faso's products will contract by 10 percent; and ii) a pessimistic scenario stating that the pandemic extends over 6 months with a 20 percent drop in world demand for Burkina Faso's exports.

At the national level, the measures adopted by the authorities to contain the spread of the Covid-19 pandemic could lead to a reduction in production capacity in the production sectors. According to the West African Economic and Monetary Union Report (WAEMU 2020), all economic sectors (Agriculture; Industry and Service) have been negatively affected in West African Economic and Monetary Union (Benin, Burkina Faso, Cote d'Ivoire, Guinea Bissau, Mali, Niger, Senegal and Togo). Additional arguments from national experts and resource persons conclude that the measures against the spread of Covid-19 have allowed national firms to adapt to this situation by taking measures (rotation system, reduction of staff) to ensure the continuity of activities. Therefore, the reduction in the productive capacities of the sectors would be less than 15 percent. Because of this uncertainty, two alternative hypotheses (scenarios) have been formulated. A reduction in the productive capacities of the sectors by 10 percent in the optimistic scenario and by 20 percent in the pessimistic one.

At the international level, the Covid-19 pandemic could also lead to a contraction in world demand for Burkina Faso's exports. Indeed, the hypothesis of a drop in world demand for Burkina Faso's exports is justified given the decline in growth (or even recession) in the world economy, leading to a reduction in the purchasing power of foreign consumers. Moreover, the negative shock on export demand can reflect the non-tariff trade barrier (international trade restriction measures) that affects international trade during pandemic periods. We assume that the world demand for Burkina Faso's exports will be reduced by around 10 percent in the optimistic scenario and by 20 percent in the pessimistic one, respectively.

5. Empirical results

The results are presented in graphs forms. These are percentage variations compared to a hypothetic baseline scenario without the Covid-19.

5.1. Macroeconomic impacts

At the macroeconomic level, the COVID-19 crisis could result in a significant drop in the economic growth rate (figure 2) in the optimistic scenario (1.38 percent against a forecast

growth of 6.5 percent for 2020) and an economic recession (-1.75 percent) in the pessimistic scenario. This represents a loss of real Gross Domestic Product (GDP) ranging from 345 billion to 645 billion CFA francs.

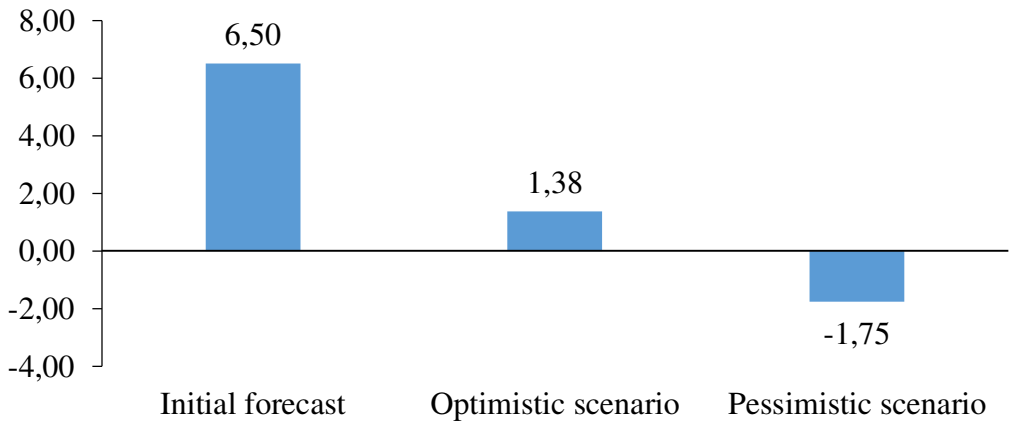

Figure 2. Impact on real GDP growth rate (percent)

Figure 3 highlights the impacts on the three main sectors namely Agriculture, Industry and Services. The industrial and services sectors could be the most affected. Then the agricultural sector, will also suffer from the crisis. The negative effect on agriculture stems from the difficulties encountered by the industrial sector for which it is a supplier of raw materials and is at the same time dependent on the latter which supplies it with agricultural inputs.

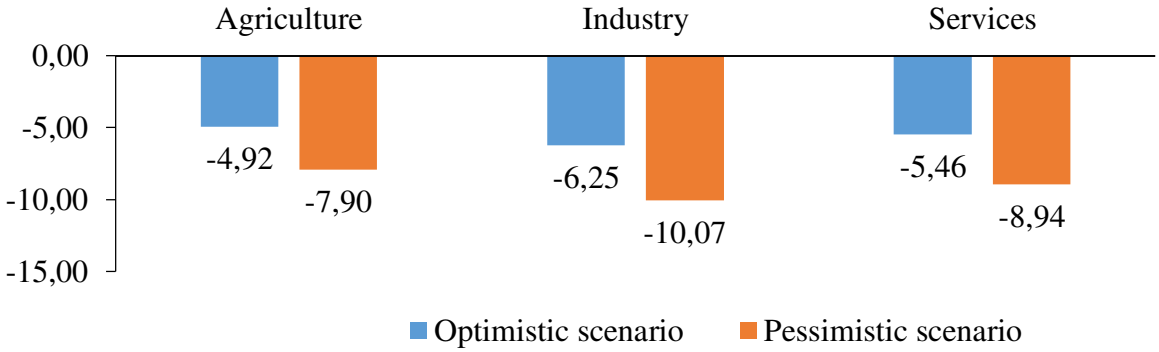

Figure 3. Impacts on the production of the aggregated sectors (percent)

The fall in economic activity will generate a drop in public revenue, which could lead to a larger public deficit reaching -4.53 percent of GDP in the optimistic scenario, and -6.12 percent of GDP in the pessimistic scenario (figure 4) compared to a forecast deficit of around 3 percent of GDP.

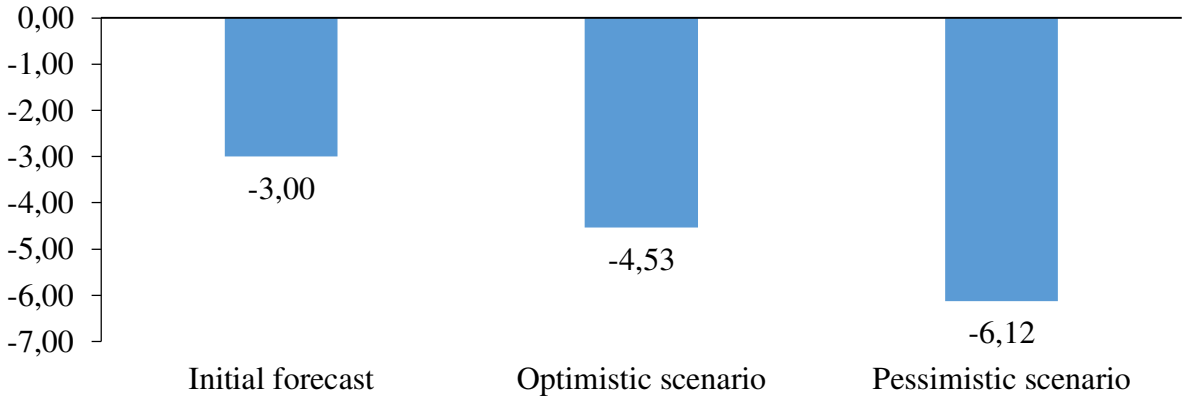

Figure 4. Impacts on the public deficit (percent du PIB)

5.2. Sectoral impacts

The evolution of the production of the disaggregated sectors (Figure 5) shows that, in general, the sectoral productions could experience a significant drop ranging from -3 percent to -13 percent, depending on the sector and the scenario. The drop in production in some sectors could be smaller than the drop in simulated productive capacity, illustrating the fact that the adjustment measures undertaken by certain sectors could effectively reduce the expected declines in production.

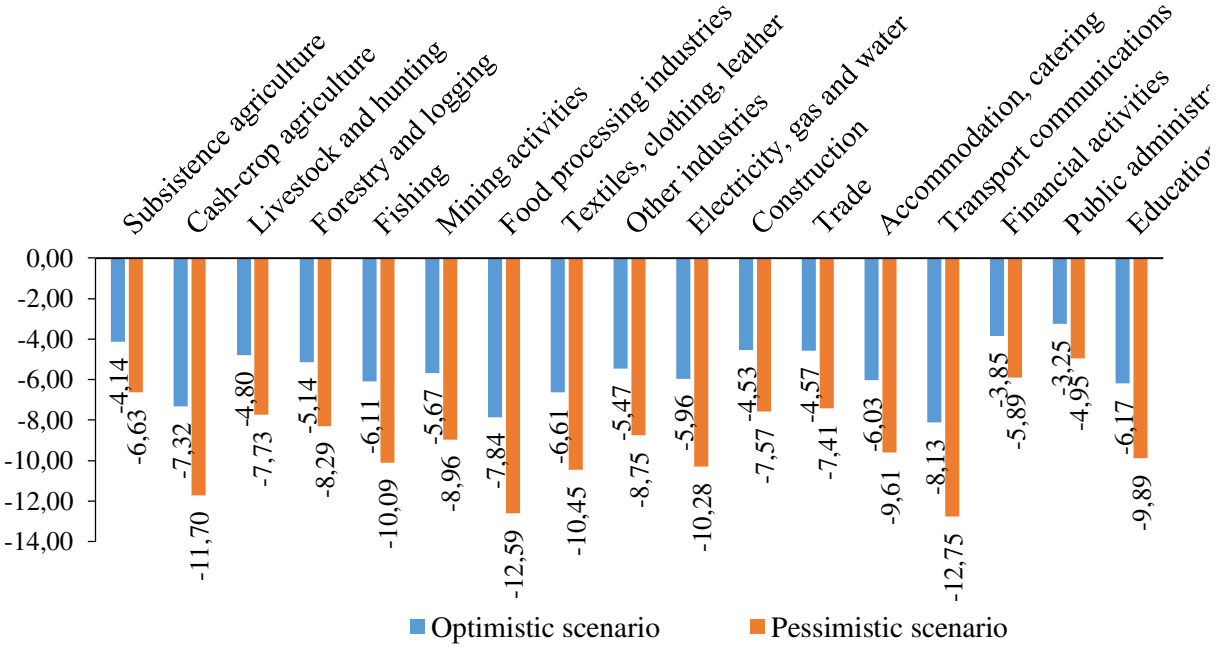

Figure 5. Impacts on sectoral productions(percent)

The fall in the sectoral production and the contraction in world demand for Burkina Faso's exports will undoubtedly generate a significant drop in sectoral exports, which can reach -10 percent for mining products (gold in particular) and -16 percent for cash crops (cotton in particular) (Figure 6). Given that exports structure depends highly on primary products such as gold and cotton, the country will lose economic resources. Indeed, as gold and cotton represent more than 50 percent of Burkina Faso's export earnings, one can expect the extent of the shortfall.

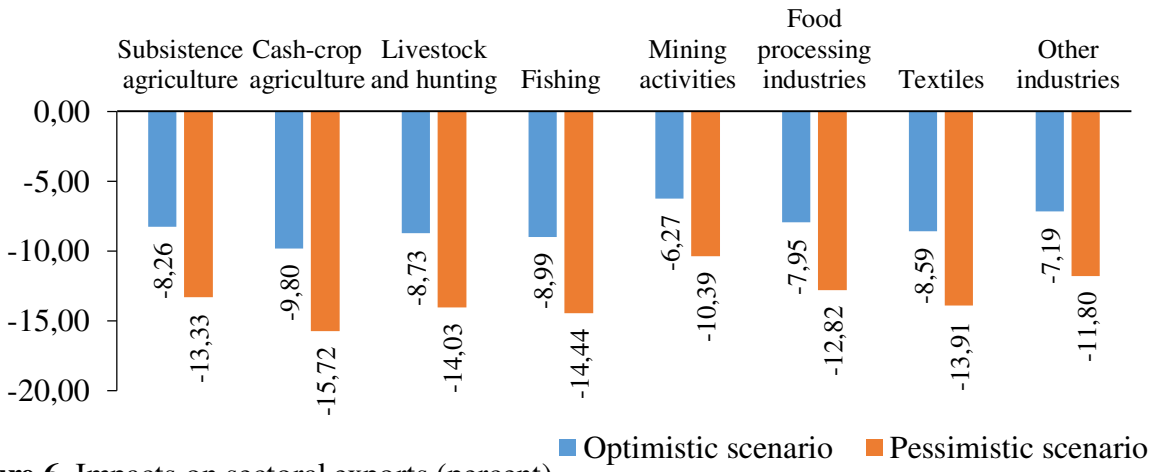

Figure 6. Impacts on sectoral exports (percent)

5.3. Impacts on the well-being

The contraction of domestic supply of the production sectors, as well as the international trade restriction due to the protectionist policies adopted by developed and emerging countries, will likely cause a surge in consumer prices (Figure 7). The expected increase could be stronger for agricultural prices (+6 percent) and the price of catering (+4 percent). The slight increase in non-agricultural prices can be explained by the fact that, given the negative shock to real incomes, households will devote most of their resources to spending on essential (agricultural) goods to the detriment of non-agricultural goods.

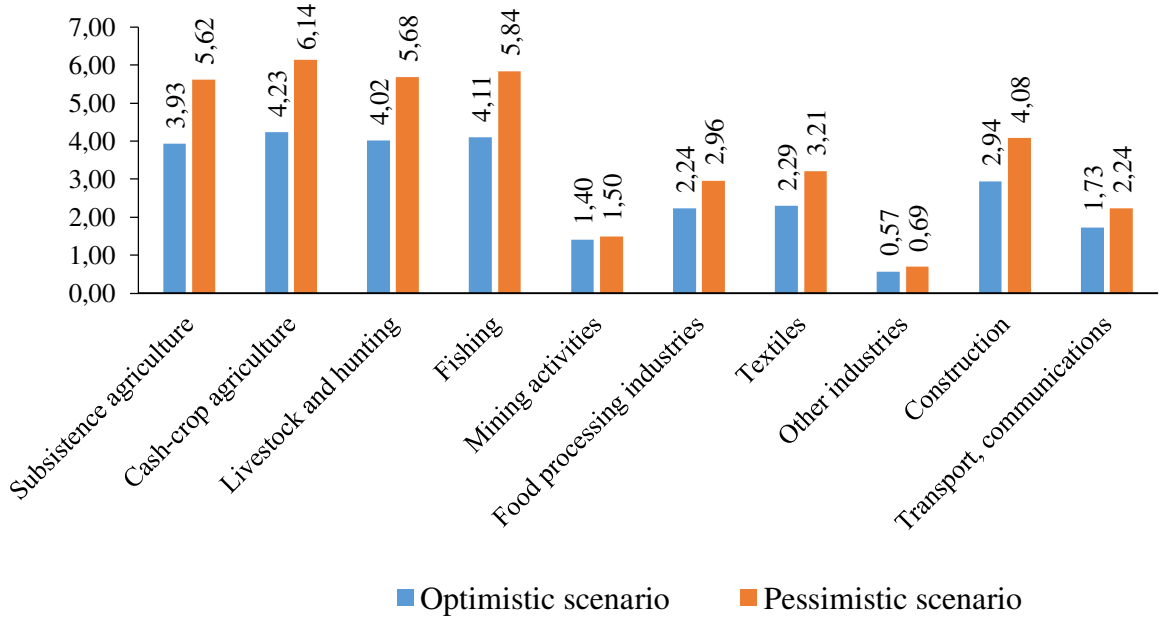

Figure 7. Impacts on consumer prices (percent)

In addition, the contraction of the sectoral production could lead to an increase in unemployment (Figure 8) as some companies will be forced to release a significant part of their employees to survive the crisis. We know that the formal, and especially informal, private service sectors are the major providers of jobs in Burkina Faso. These sectors will undoubtedly suffer the effects of the COVID-19 crisis. This will therefore have negative effects on employment from 1.93 percent to 5.92 percent.

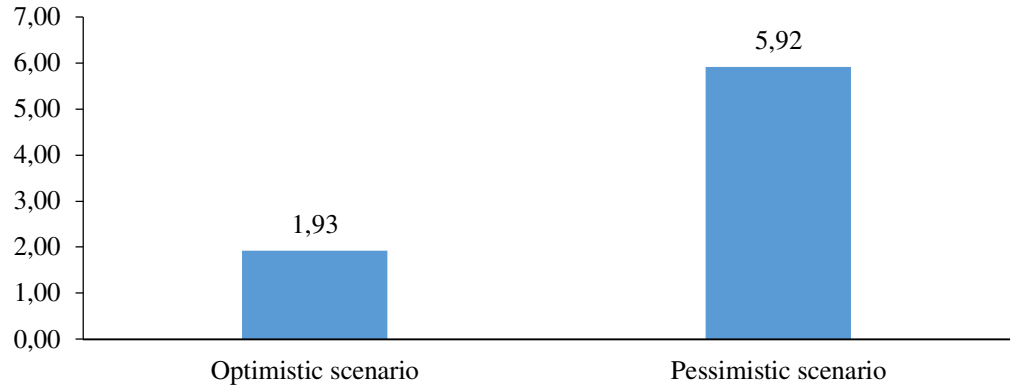

Figure 8. Impacts on unemployment (percent)

The inflation, especially for agricultural products and the fall in employment – leading to a reduction in nominal incomes – will lead to a sharp deterioration in the purchasing power of households for all socio-economic professional categories (figure 9).

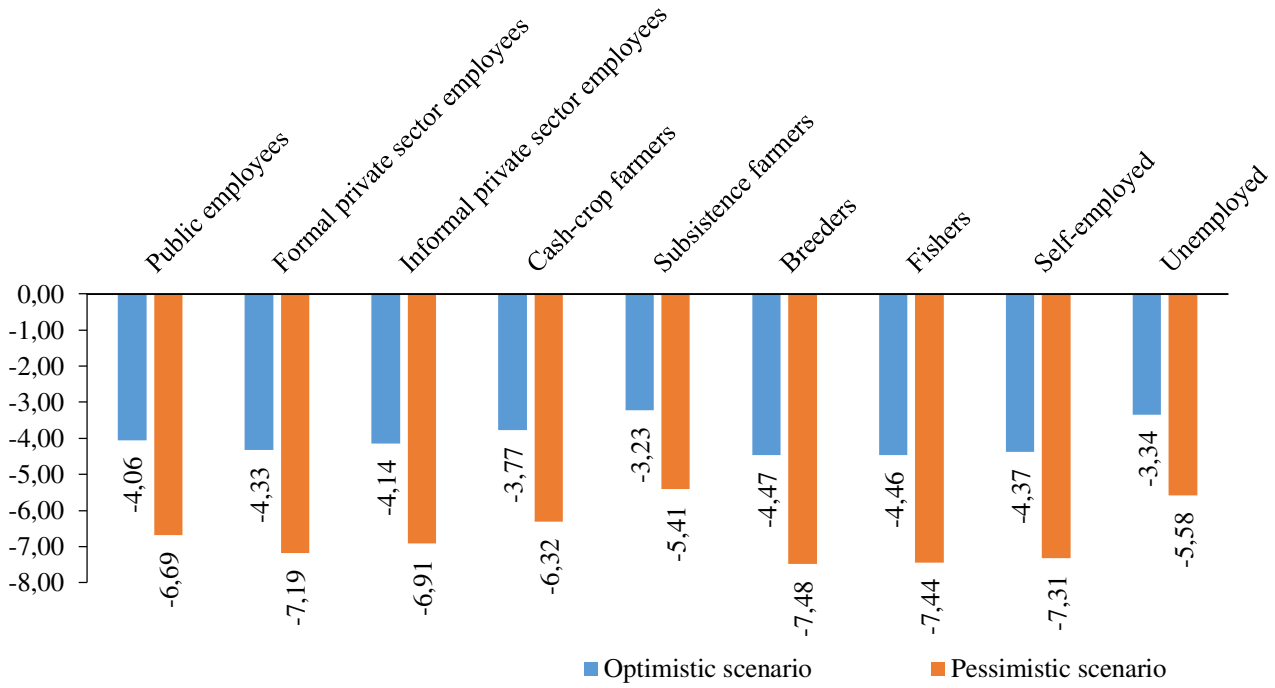

Figure 9. Impacts on households' purchasing power (percent)

Our macroeconomic results for Burkina Faso (-5.12 percent of GDP) are within the range of previous studies conducted before COVID-19 for developed countries. Indeed, for the United States, Dixon et al. (2010) and Prager et al. (2017) have modelled milder H1N1 type scenarios and found impacts on GDP of -1.6 percent and -0.337 percent respectively. For Australia, Verikios et al. (2012) have modeled a severe scenario which is much similar to COVID-19 in effect and have pointed out an impact of -6.2 percent on GDP.

5.4. Sensitivity test: updating the 2012 SAM

Even though the social accounting matrix used in this paper is the most recent, it dates back almost a decade. We have therefore re-run the simulations by recursively updating it to get a SAM for the year 2020. The figures 10 and 11 show the impacts on real GDP growth rates and the aggregated sectors[1]. The results show that the impacts obtained with the updated SAM are similar to those obtained with the initial SAM, although the magnitude of these impacts is slightly lower with the updated SAM.

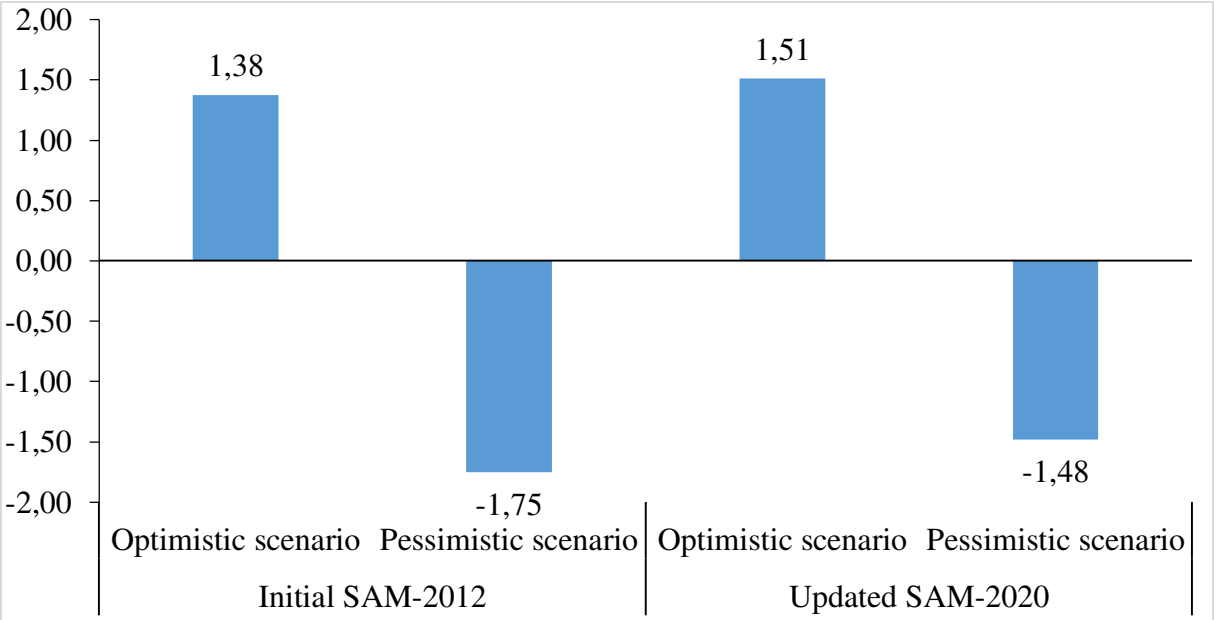

Figure 10. Impact on real GDP growth rate (percent)

[1] Other results are available upon request to the authors.

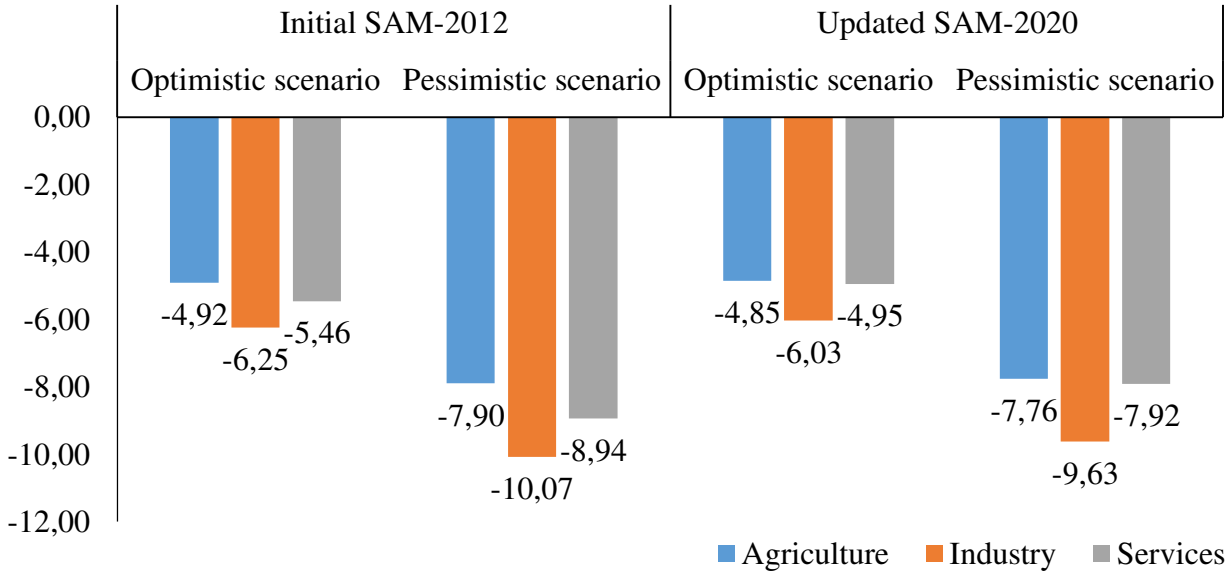

Figure 11. Impacts on the production of the aggregated sectors (percent)

6. Conclusion and policy recommendations

The objective of this paper was to analyze the impact of the Covid-19 on the economy of Burkina Faso. The results indicate significant impacts on both macroeconomic and sectoral level and on the households' well-being. First, the economic growth could drop from 5.7 percent in 2019 to a range between +1.38 percent and -1.75 percent in 2020. Moreover, the unemployment is expected to grow because of a sharp drop in sectoral productions. In addition, our findings reveal a contraction of sectoral exports. Finally, the rise of consumer prices and unemployment will greatly dampen the purchasing power of households.

In addition to health consequences of the Covid-19, a socio-economic disaster could ensue if the public authorities do not adopt the appropriate measures to restore the national economy. As a first reflection, we believe that it will be necessary to think on a global, structuring, and endogenous strategy of economic recovery which will be based on the internal capacities of the country and on the needs of the agents. To do this, it would be necessary to implement measures both on the demand and the supply sides. Thus, the government should provide temporary and targeted support to households, particularly the most vulnerable ones. Then, financial support could be granted to companies and sectors (labor intensive) which are really in difficulty. But beyond these specific actions partially implemented, it is fundamental to focus on the restructuring of the country's productive system so as to make it dedicated essentially to respond to the domestic demand, which is mainly supplied by local raw materials.

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Appendice: Table A.1. The structure of the national economy in 2012

	Production		Value added		Imports		Exports		M/Q	X/XS
	Millions of CFA francs	%	Millions of CFA francs	%	Millions of CFA francs	%	Millions of CFA francs	%		
Subsistence agriculture	861 561	10.15	749 867	15.79	20 686	0.98	40 747	2.80	2.31	4.73
Cash-crop agriculture	298 103	3.51	239 850	5.05	4 006	0.19	55 570	3.82	1.59	18.64
Livestock and hunting	671 908	7.91	534 516	11.26	209	0.01	19 457	1.34	0.03	2.90
Forestry and logging	202 601	2.39	188 326	3.97	6	0.00	247	0.02	0.00	0.12
Fishing	12 176	0.14	11 775	0.25	37	0.00			0.17	
Mining activities	941 255	11.09	512 677	10.80	4 222	0.20	886 195	60.89	14.52	94.15
Food processing industries	832 351	9.80	166 962	3.52	217 419	10.26	12 881	0.89	17.11	1.55
Textiles, clothing, leather	312 820	3.68	90 158	1.90	37 559	1.77	179 417	12.33	21.46	57.35
Other industries	297 176	3.50	73 132	1.54	1 476 884	69.72	45 278	3.11	60.16	15.24
Electricity, gas and water	140 914	1.66	35 717	0.75	26 692	1.26			14.88	
Construction	641 512	7.56	240 845	5.07	35 125	1.66	31 476	2.16	4.54	4.91
Trade	744 843	8.77	475 746	10.02						
Accommodation, catering	146 674	1.73	15 705	0.33						
Transport communications	471 874	5.56	205 949	4.34	81 017	3.82	70 191	4.82	16.20	14.87
Financial activities	139 364	1.64	77 936	1.64	68 431	3.23	57 613	3.96	38.41	41.34
Public administration	959 997	11.31	704 027	14.83	24 978	1.18	6 602	0.45	2.56	0.69
Education	248 180	2.92	171 894	3.62						
Health and social work	567 341	6.68	252 998	5.33	121 091	5.72	49 640	3.41	18.53	8.75
Total	8 490 650	100	4 748 078	100	2 118 362	100	1 455 314	100	20.14	17.14

M/Q is the share of imports in domestic absorption; X/XS is the share of exports in sectoral production.