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Private Savings and COVID-19 in Sub-Saharan Africa

Boileau Loko, Nelie Nembot, and Marcos Poplawski-Ribeiro

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Private Savings and COVID-19 in Sub-Saharan Africa
Prepared by Boileau Loko, Nelie Nembot, and Marcos Poplawski-Ribeiro

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ABSTRACT: The paper reexamines the main private savings determinants in Sub-Saharan Africa (SSA), followed by an analysis of the COVID-19 pandemic impact on private savings in SSA and other country groupings. Using an unbalanced panel data from 1983–2021 for 31 SSA economies, the paper finds that real per capita economic growth remains a key historical determinant of private savings in the region. In contrast with other regions, private saving rates have not increased during COVID-19 in SSA. Instead, COVID-19 deaths in our estimations are significantly associated with a decline in private savings in SSA. Robustness checks and a descriptive analysis of household surveys during the pandemic corroborate those results.

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Author's E-Mail Address:	bloko@imf.org; Nelie.Angele.Nembot@USherbrooke.ca; mpoplawskiribeiro@imf.org

WORKING PAPERS

Private Savings and COVID-19 in Sub-Saharan Africa

Prepared by Boileau Loko, Nelie Nembot, and Marcos Poplawski-Ribeiro¹

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Introduction

Low private saving rates in Sub-Saharan Africa (SSA) represent one of the main bottlenecks for development in the region. They are associated, for example, with a lack of consumption smoothing, risk management, and financing of important life goals such as education and starting a business, particularly for the most vulnerable in society. Domestic savings are also a key component in solving the financing puzzle to achieve the sustainable development goals (SDGs) (Gaspar and others, 2019) and to fight climate change (Belianska and others, 2022) in the region.

While private saving rates in SSA have been catching up in recent years prior to the pandemic, its distribution remains still below other emerging and developing economies (EMDEs) country groups (Figure 1). In addition, there is significant heterogeneity across countries, with savings notably low in fragile states and volatile in economies subject to exogenous shocks, such as natural disasters or commodity price fluctuations. In the meantime, the emergence of COVID-19 in late 2019 led to harmful economic impacts in the region (Miguel and Mushfiq Mobarak, 2021), which could have also affected the accumulation of private savings.

The macroeconomic context in SSA even before COVID-19 had already created many challenges for savings build-up, including the high debt levels in several economies (Selassie, 2018); fast population growth rates; and elevated uncertainty on the external environment, including for commodity prices (Gruss, Nabar, and Poplawski-Ribeiro, 2020). In addition, although access to formal financial products have grown in recent years—through the gradual development of banking and capital markets in SSA and the rise of digital financial services and inclusion—a large share of the population (close to 46 percent) is still not able to save at all and less than a third of the existent savers in 2017, for example, has done it through formal financial institutions (Dezso, Robinson, and Singh, 2018).

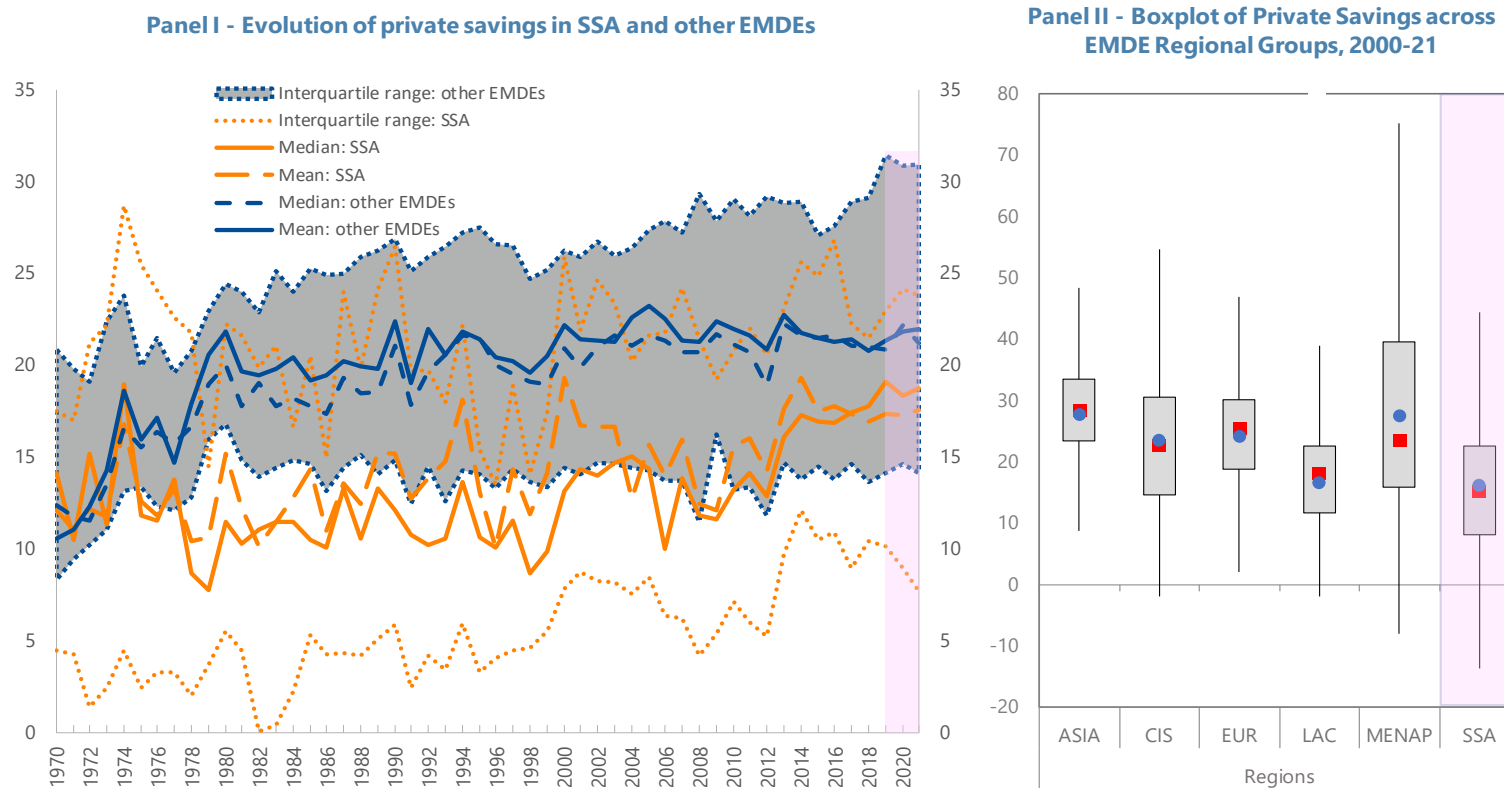
Against this backdrop, this paper has two main objectives and contributions to the literature. First, it reexamines the main determinants of private savings in the SSA region and compares them with other world regions. Second, to the best of our knowledge, this is the first paper to investigate the impact of COVID-19 (and the associated preventive measures) on private savings in SSA. Regarding this latter objective, so far, the studies and surveys on SSA (IMF, 2020 and 2021a; Miguel and Mushfiq Mobarak, 2021) have focused on the impact of COVID-19 on other economic variables, such as growth and poverty, but not on private savings.

Intuitively, the impact of COVID-19 on private savings could go both ways. On one hand, firms and households (particularly those with low income) may have resorted to a depletion of their private savings given the slowdown in economic activity, increase in poverty, and the effect of preventive measures (such as the lockdowns) on their capacity to work and to obtain income outside their homes. On the other hand, as observed in other world regions,² those economic agents may have increased their savings for precautionary motives or owing to the foregone consumption caused by the preventive measures against the pandemic.³

² See IMF (2021b) for a discussion in advanced economies (AEs); and Lee Smith (2020), Attinasi, Bobasu, and Manu (2021), and Ercolani, Guglielminetti, and Rondinelli (2021) for more specific discussions for the US, Europe, and Italy, respectively. In contrast to our results to SSA, all those papers document a substantial increase in private savings during COVID-19 in these (more advanced) regions.

³ This latter possibility may have been especially feasible in countries where governments provided financial support to mitigate the economic effects of the pandemic and where a significant share of households were able to telework from home.

Figure 1. Evolution of Private Savings in SSA and other EMDEs and their Recent Distribution across EMDE Groups
(Percent of Gross Private Disposable Income - GPD)



Sources: World Economic Outlook (WEO) database; Grigoli, Herman, and Schmidt-Hebbel (2018); and authors' calculations.

Notes: The sample includes an unbalanced panel of all country-years with data availability for the private savings rate. SSA = Sub-Saharan African economies; EMDEs = Emerging and developing economies; ASIA = Developing Asian economies; CIS = Commonwealth of Independent states; EUR = Emerging European economies; LAC = Latin American countries; MENAP = Middle East, North Africa, Afghanistan, and Pakistan economies.

In line with IMF (2021a), Panel 1 of Figure 1 shows that private saving rates have not increased during the first year of the COVID-19 pandemic in SSA.⁴ This is in stark contrast with the findings for other regions and country groups, notably in advanced economies (AEs), where private savings rates have sharply increased during the pandemic (IMF, 2021b).

Hence, in order to achieve the two main objectives of the paper, four types of analyses are performed:

- First, the paper describes historical macro trends and stylized facts on SSA's private savings at macro-level across different sub-regions and country groups in the last four decades, including in the recent period of the COVID-19 pandemic.
- Second, the paper presents stylized facts of the impact of COVID-19 on household savings at micro level using household surveys from the United Nations Development Program (UNDP, 2020) in the second and third quarters of 2020 for selected SSA economies.
- Third, the paper estimates empirically the determinants of private savings in the last four decades in SSA and compares the results with the full world sample and other world regions. The baseline estimations are further checked through robustness tests and by including additional variables that are particularly relevant for the SSA region, such as labor informality (Schclarek and Caggia, 2015; and Dobson et al., 2020) and years of conflicts (Torres Garcia et al., 2019).
- Fourth, the paper investigates econometrically the effects of COVID-19 (cases and deaths per million people per country) on the changes in private saving rates in SSA, controlling for other determinants and using the period sample 2017–21. That analysis also zooms in on the stringency of preventive measures and on vaccination against COVID-19.

Our results suggest that *real per capita economic growth* remains one of the most important determinants of private saving in SSA. Every 1 percentage point increase in *real per capita gross private disposable income (GPD) growth (in PPP terms)*—a value that is approximately close to the median of *real per capita GPD growth* between 2020 and 2021 in our SSA country sample— is, on average, associated with an increase in 0.45 percentage points of GPD in the SSA countries' private savings rate. While in the baseline estimations economic growth is measured by changes in the real per capita GPD, this result is robust to the use of real gross domestic product (GDP) growth. This finding is moreover in line with Elbadawi and Mwega (2000) and Shawa (2016). The former authors already show that the causality in SSA goes from economic growth to private investment and savings rather than on the other way around. Although not significant in the baseline specifications, in some other estimations, the lagged dependent variable, the rate of SSA countries' urbanization, and public savings are found statistically significant and with the expected signs from the economic literature.

Importantly, our econometric analyses suggest that the pandemic is, on average, negatively associated with the change in private savings of SSA households. We find a statistically significant and negative coefficient for the number of COVID-19 deaths per country's million inhabitants in estimations using

⁴ Table A in Annex I presents the list of countries of each country group, whereas Table B reports the list of countries used in each of the econometric analyses of this paper. Table C in Annex II reports the descriptive statistics for the private saving rates and for all other variables for the list of SSA countries used in the estimation. There, we can see that the first differences of the two measures of private saving rates used in the paper are, on average, negative in SSA economies during the COVID-19 period analyzed (2020 and 2021).

changes (first differences) in private saving rates in SSA.⁵ Every 10 COVID-19 deaths per million people in SSA countries—approximately close to the median of COVID-19 deaths per million people between 2020 and 2021 in our SSA country sample—is, on average, associated with a decline in 0.2 percentage points of GDP in the change of their private savings. Such fall in private saving rates is also suggested by descriptive statics analyses of household surveys in selected SSA economies during the pandemic, and further reported by World Savings and Retail Banking Institute–WSBI (2020) and MasterCard Foundation (2020).

We test moreover for the stringency of COVID-19 preventive measures imposed by authorities (Hale and others, 2021) and for the number of COVID-19 vaccination shots as percentage of each SSA country's population. But the results of those econometric analyses are inconclusive with none of the two variables being statistically significant in any of the estimations for SSA. Therefore, both variables seem not to be strongly associated with changes in private savings in our sample of SSA economies at least for the first two years of the pandemic.

In sum, the paper shows that real per capita economic growth is key to boost private saving rates in SSA. That is another reason for SSA economies to continue adopting policies and structural reforms to recover from the economic effects of the pandemic and boost their real per capita growth. Regarding the number of COVID-19 deaths, their negative association with changes in private saving rates in SSA calls once more for a strong sanitary response to the pandemic through health policies such as mass testing and, particularly, through vaccination (Agarwal and Gopinath, 2021). Otherwise, COVID-19 may continue impacting on private savings and bring additional long-term risks (Agarwal and others, 2022), reducing an important financial source (domestic private savings) to reach the SDG goals in the region.

The rest of paper is organized as follows. Section 2 provides descriptive statistics and stylized facts at the *macro level* on private savings and COVID-19 across different world regions and SSA country groups. Section 3 presents some stylized facts about the *micro level* impact of COVID-19 on household savings through recent UNDP household surveys prepared in SSA. Section 4 revisits the main determinants of private savings in SSA and compares the results with other country groupings. Section 5 investigates the impact of COVID-19 (and the associated preventive measures and vaccination) on private savings. Section 6 reports some robustness checks and additional tests. Section 7 concludes the paper.

Trends and Stylized Facts on Private Savings and COVID-19

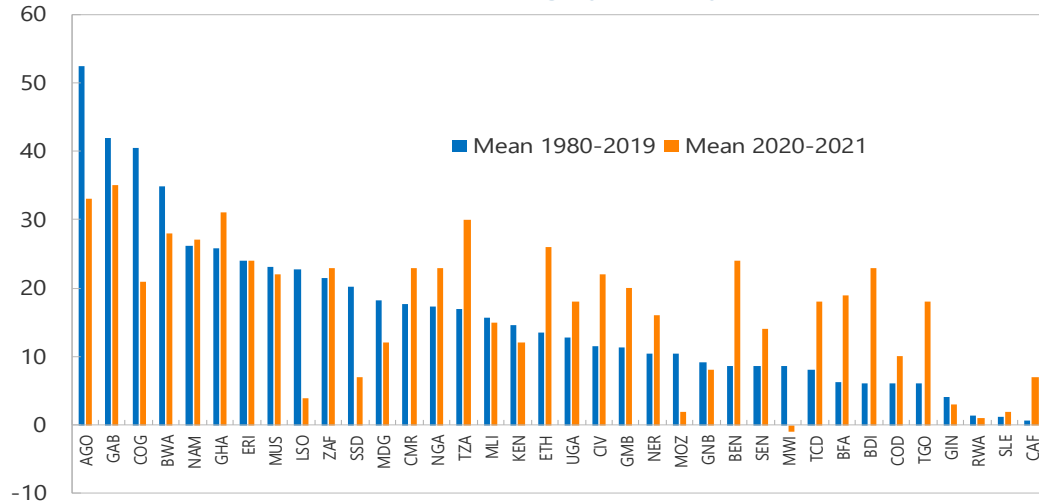
This section presents some *macro* and *micro* stylized facts to understand recent trends in private savings in the SSA region.

⁵ The number of COVID-19 deaths per million people rather than just *cases* may capture more severe manifestations (or the *mortality*) of COVID-19 in a particular SSA economy. Yet, as it will be shown, the paper also looked at the number of cases per million people in each country and both COVID-19 variables are interpreted as more general pandemic proxies. The coefficient for cases per million people in each country, although also negative in our estimations, is not statistically significant.

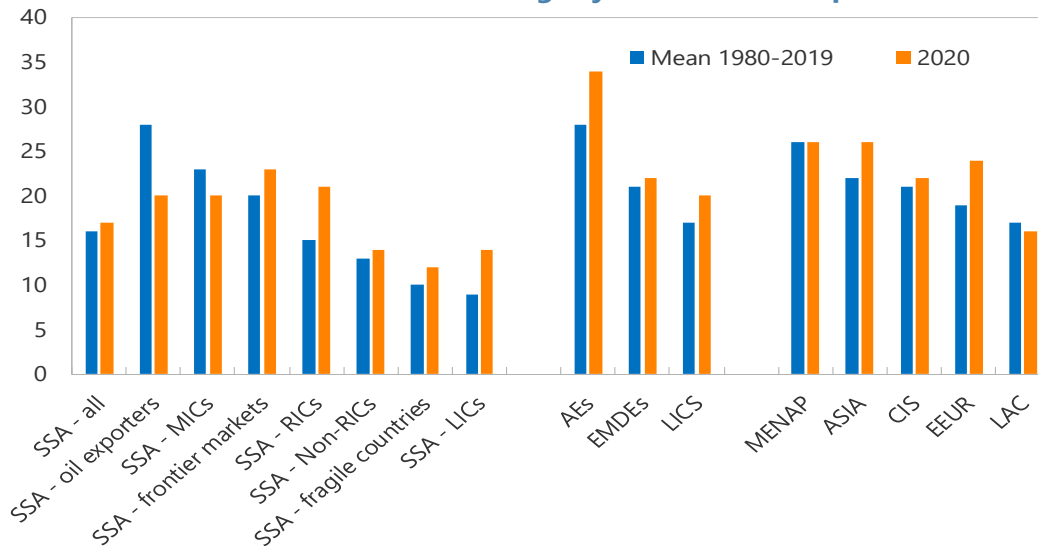
Figure 2. Private Savings by EMDEs Regional Groups and SSA Economies*

(Percent of Gross Private Disposable Income – GDPi)

Panel I - Private Saving by Country in SSA



Panel II - Private Savings by Countries' Groups



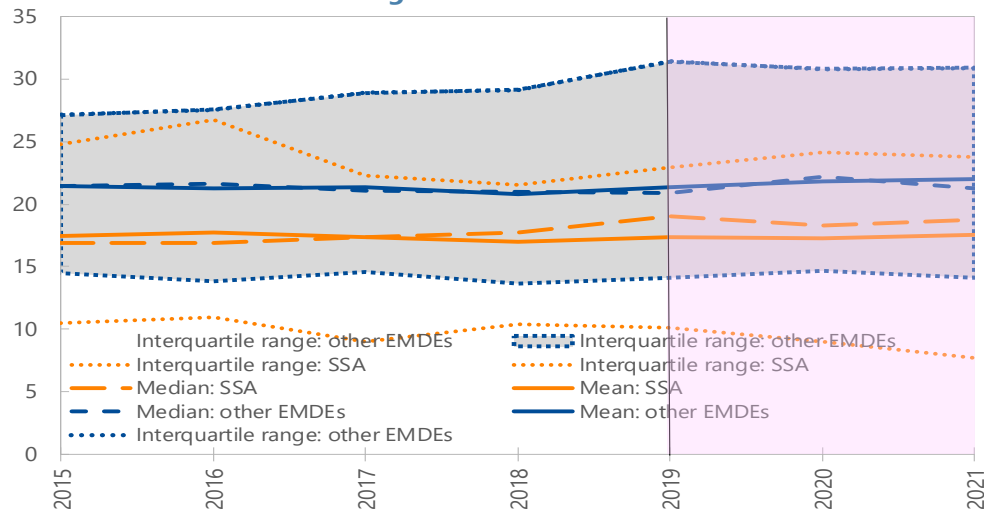
Sources: World Economic Outlook (WEO) database; Grigoli, Herman, and Schmidt-Hebbel (2018); and authors' calculations.

Notes: * For period samples see Panel charts' legends. SSA country acronyms and country groups are defined as in IMF (2021). SSA = Sub-Saharan African economies; MICs = Middle-Income countries; RICs = Resource-intensive countries; LICs = Low-income countries; AEs = Advanced economies; EMDEs = Emerging and developing economies; MENAP = Middle East, North Africa, Afghanistan, and Pakistan economies; ASIA = Developing Asian economies; CIS = Commonwealth of Independent states; EEUR = Emerging European economies; LAC = Latin American countries.

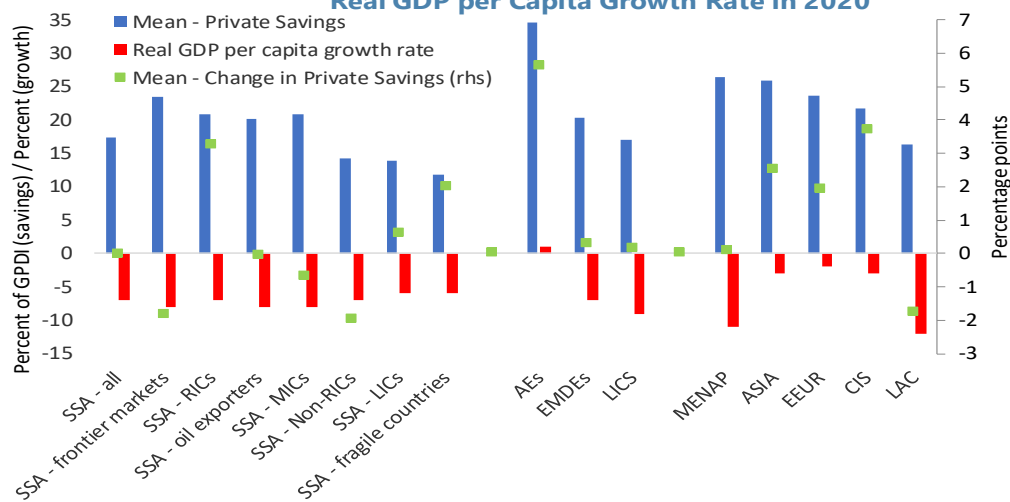
Figure 3. Savings and Real GDP Per Capita Growth in SSA during COVID-19*

(Percent of Gross Private Disposable Income – GDPi; unless stated otherwise)

Panel I - Private savings evolution in SSA and other EMDEs



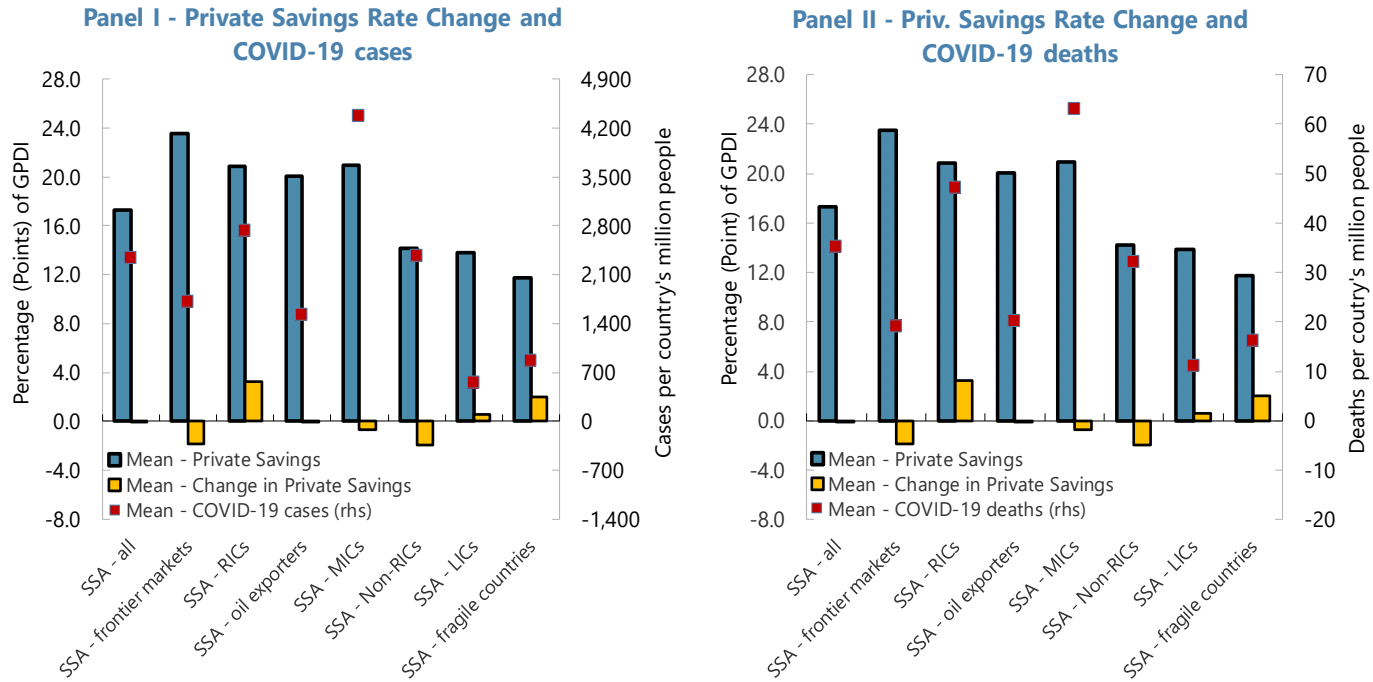
Panel II - Level and First-Difference of Private Savings vs. Real GDP per Capita Growth Rate in 2020



Sources: WEO database; World Development Indicators (WDI); Grigoli, Herman, and Schmidt-Hebbel (2018); and authors' calculations.

Notes: * For period samples see Panel I's x-axis and Panel II's legend. SSA country acronyms and country groups are defined as in IMF (2021). SSA = Sub-Saharan African economies; RICs = Resource-intensive countries; MICs = Middle-Income countries; LICs = Low-income countries; AEs = Advanced economies; EMDEs = Emerging and developing economies; MENAP = Middle East, North Africa, Afghanistan, and Pakistan economies; ASIA = Developing Asian economies; EEUR = Emerging European economies; CIS = Commonwealth of Independent states; LAC = Latin American countries.

Figure 4. Average Private Savings and COVID-19 Cases and Deaths by SSA Economic Groups, 2020*



Sources: WEO database; Grigoi, Herman, and Schmidt-Hebbel (2018); Hannah et al. (2020); and Mathieu et al. (2021); and authors' calculations.

Notes: * The units of each variable are defined in the respective y-axis titles. SSA country groups are defined as in IMF (2021). SSA = Sub-Saharan African economies; RICs = Resource-intensive countries; MICs = Middle-Income countries; LICs = Low-income countries; AEs = Advanced economies; EMDEs = Emerging and developing economies; MENAP = Middle East, North Africa, Afghanistan, and Pakistan economies; ASIA = Developing Asian economies; EEUR = Emerging European economies; CIS = Commonwealth of Independent states; LAC = Latin American countries

Macro Analysis

The private saving rate in SSA has increased during the last two decades to an average rate of 17.3 percent in 2019 from 11.5 percent in 1983 (Figure 1, Panel 1).⁶ However, there is significant heterogeneity across the SSA countries (Figure 2, Panel I). Oil exporters and middle-income countries (MICs) are the highest savers in the region (Figure 2, Panel II). Private saving rates, as expected, are particularly low in fragile states and low-income countries (LICs).

Zooming in the 2020 and 2021 years (i.e., the COVID-19 period), private savings rates do not increase in SSA, which is in stark contrast with AEs⁷ (Figure 2, Panel II; and Figure 3, Panels I and II).⁸ This already suggests the larger humanitarian and economic impact of the pandemic in SSA than in other regions and country groups, notably in AEs.⁹

Regarding COVID-19, SSA economies also have one of the lowest regional averages of officially reported cases and deaths per million people across the globe (Figure 4). This data may, however, be underestimated reflecting several factors (Karlinsky and Kobak, 2021), including capacity to test and identify deaths from the disease, and the reticence of the local population to get tested, to go to hospital and to report deaths for various reasons, including historical ones.¹⁰ WHO (2021), for example, mentions testing capacity as one of the main factors for underreported cases in Africa and estimates that, up to October 2021, *COVID-19 cases and deaths in Africa could be seven times higher than the official statistics*.¹¹ The average number of COVID-19 cases and deaths (per millions of people in the country) varies significantly across SSA country groups (Figure 4, Panel I). In that figure there is no visible correlation in SSA between the number of cases and deaths per million (respectively) and the level or change in the savings rate.

⁶ These statistics differ marginally from the averages in Table C of Annex II because here we report averages for 36 SSA economies. Table C of Annex II instead report the statistics for the unbalanced panel data sample of SSA economies used in the estimations with at least 13 and at most 31 economies (see Table B, Annex I). For the list of countries in each country group see Table A of Annex I.

⁷ For the sample of 36 SSA economies included in Figure 3, Panel I, the average private saving rates in 2020 and 2021 remains at the same level as of 2019 (17.3 percent of GDP) while the median private saving rates fell from 19.1 in 2019 to 18.3 percent of GDP in 2020, reaching 18.8 percent of GDP in 2021. Using the estimated sample of 31 SSA economies, the average decline in private savings combined in 2020 and 2021 is of -0.76 percent points of GDP (see Table C in Annex II). This is again in contrast with AEs, where the increase in private savings during the pandemic (2020 and 2021) is on average above 5 per cent of GDP. Notice that with exception to the SSA sample, the statistics for the other country groups are not displayed in the paper, but available upon request to the authors.

⁸ In other EMDEs (excluding SSA), the average increase in private savings during 2020 and 2021 was of 1.9 percent of GDP, even though Latin America (LAC) and the Middle East and Pakistan (MENAP) seem to be the two world regions that observed the largest decline in economic growth in 2020.

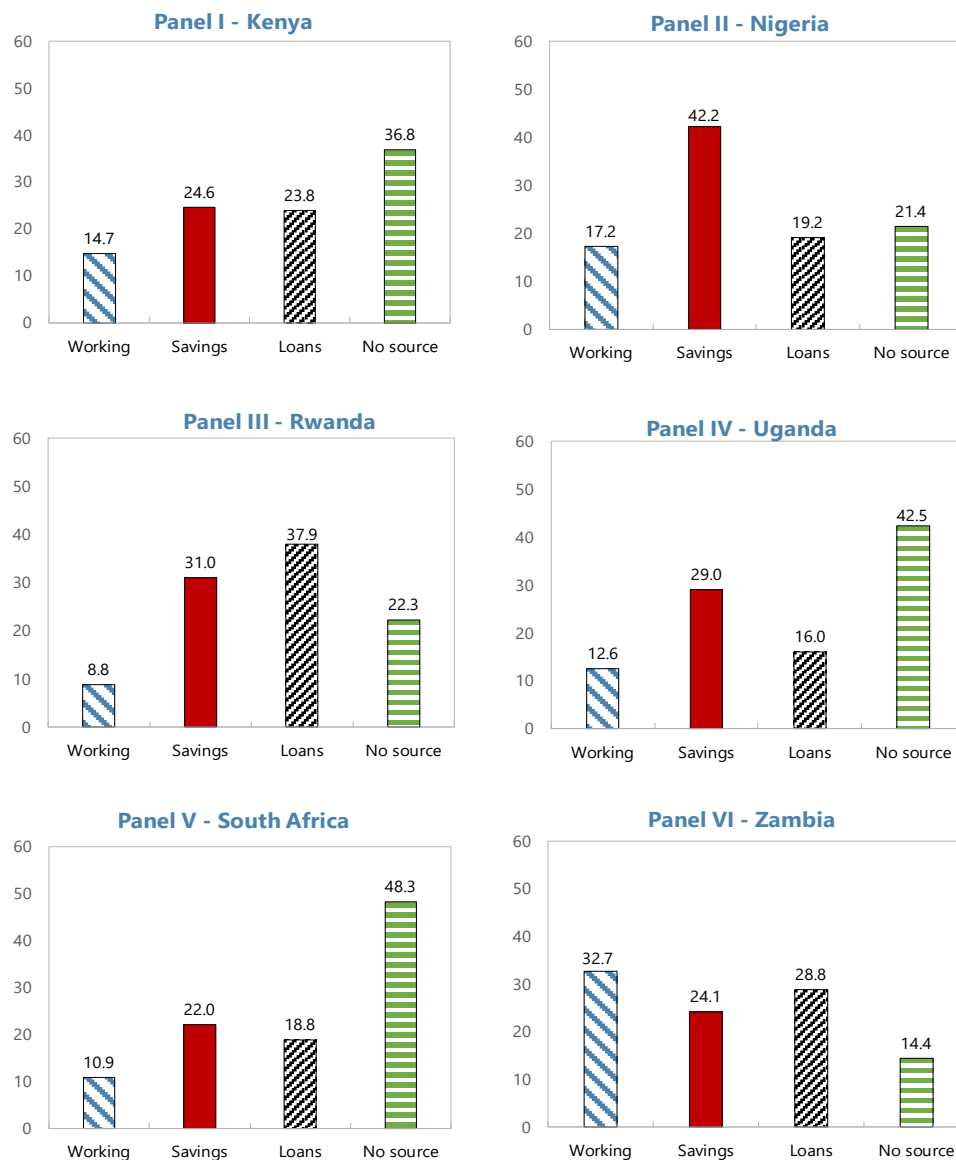
⁹ For the full sample of LICs the average change in private savings for 2020 and 2021 is also negative.

¹⁰ Aizenman and others (2022) studies which economic and institutional variables are associated with a high difference between official mortality rates by COVID-19 and the countries' excess mortality during the pandemic, including per capita GDP. Lowes and Montero (2021), in turn, highlight historical reasons for skepticism towards vaccination, medical tests, and medication.

¹¹ Up to October 2021, WHO (2021) accounted for 8 million COVID-19 cases reported in Africa.

Figure 5. Source of Financing of Households Surveyed during COVID-19 in Selected African Economies, 2020*

(Share of households surveyed, percent)

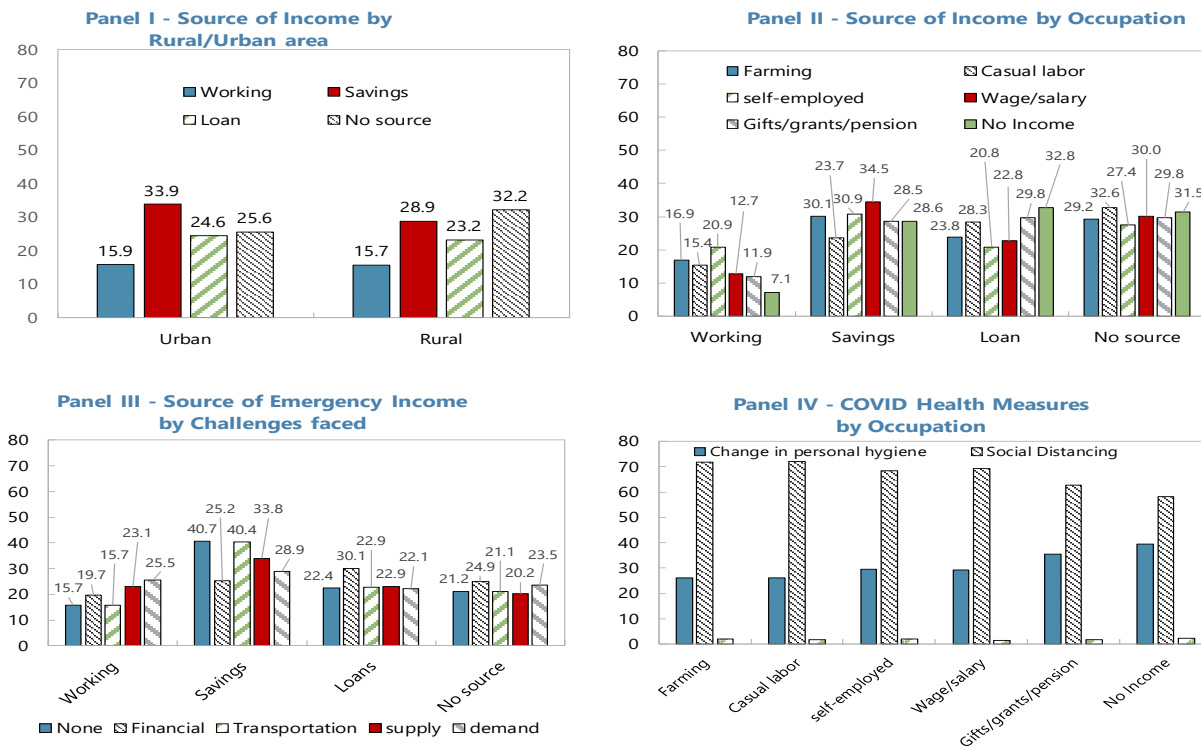


Sources: UNDP (2021); and authors' calculations.

Notes: * The numbers on top of the bars represent the precise share. The category "No source" represents the share of households that did not answer that question. The two questions of UNDP's (2021) used to prepare this chart were: "Question 44 – How possible is it for you to come up with [1/20th of GNI per capita] in 7 days for a sudden need?"; and "Question 45 – What would be your main source of funds?"

Figure 6. Households' Income Characteristics during COVID-19 in Selected African Economies, 2020*

(Share of households surveyed, percent)



Source: UNDP (2021); and authors' calculations.

Notes: * The numbers on top of the bars represent the precise share. The category "No source" represents the share of households that did not answer that question. The UNDP's (2021) questions used to prepare this figure were as follows. Panel I: "Question 9. Do you currently live in a city, urban area, or rural area?"; and "Question 45. What would be your main source of funds?". Panel II: "Question 22. Which of the following best describes the way the main income earner made money before March 1st? Categories: farming, casual work, own business or self-employed, formally employed, income received from others, no income received."; and "Question 45. What would be your main source of funds?". Panel III: "Question 27. Which of the following is the biggest challenge for this business since March 1st?"; and "Question 45. What would be your main source of funds?". Panel IV: "Question 22. Which of the following best describes the way the main income earner made money before March 1st?"; and "Question 68. How have you changed your behavior since learning about Coronavirus or Covid-19 or Corona?".

Micro Analysis

To investigate the micro impact of Covid-19 on household savings in SSA, we use household surveys from the United Nations Development Program (UNDP) in six selected economies out of the 31 countries where the UNDP has run the surveys in Africa (UNDP, 2020a).¹² The countries selected are Kenya, Nigeria, Rwanda, South Africa, Uganda, and Zambia. The surveys contain responses from a minimum of 1,159 households for Zambia up to 6,120 households for Nigeria.¹³

The results of the household surveys corroborate those of the macro analysis from the previous section. They suggest that a significant share of African households has depleted its savings during COVID-19 (Figure 5), which is further in line with the estimation outcomes that will be presented below. Savings depletion is the first or second source of financing during COVID-19 in all six countries investigated. Savings are also the main source of (emergency) income for households living both in rural and urban areas (Figure 6, Panel I), salaried professionals, self-employed and farming (Figure 6, Panel II). A significant share of households also reported that the depletion of savings is related to transportation issues and the possibility of supplying labor (most likely because of the social distancing measures and lockdowns) during COVID-19 (Figure 6, Panel III). Social distancing was further the main form of COVID-19 prevention among households of all types of occupation (Figure 6, Panel IV).¹⁴

Historical Savings Determinants in SSA and Across Income Groups

This section investigates the main historical determinants of private savings in SSA and compare the results with the full world sample and with different world income groups (AEs, EMs excluding SSA, LICs, and LICs). The section begins with a description of the baseline model and of the data. It then reports our main results and those with additional determinants sometimes suggested by the related literature.

¹² The UN has run *Socioeconomic Impacts Assessments (SEIA)* for 63 economies in the world under the leadership of the UNDP to analyze socioeconomic trends, the impact of COVID-19 in the overall SDG achievement and to help authorities to develop socioeconomic recovery plans (UN, 2020a). The list of SEIAs and links to each country's report can be found online at <https://www.undp.org/coronavirus/socio-economic-impact-covid-19>. For example, the SEIA findings for Rwanda can be retrieved at UN (2020b).

¹³ Descriptive statistics for the micro data are not shown here but are available upon request to the authors. Each question of the survey that allowed us to prepare the figures are presented in figure itself as part of the figure note. Given that the survey was created for COVID-19, it is impossible to compare its responses with previous surveys. This lack of comparison with previous years is a caveat to the interpretation of the figures.

¹⁴ The depletion of savings also seems to marginally increase for older households. Contrarily, older age seems associated with less borrowing to finance the households during COVID-19. While these last stylized facts are not shown here, they are available upon request to the authors.

Baseline Model

As our baseline econometric model, we use the following panel estimation:

$$savings_{i,t} = \gamma savings_{i,t-1} + \beta X_{i,t} + \delta Z_{i,t} + \alpha_i + \tau_t + u_{i,t}, \quad (1)$$

where $savings_{i,t}$ denotes private savings rates as percentage of GDP for country i and time t introduced in the previous section; $X_{i,t}$ is a set of endogenous (and predetermined) covariates for savings; $Z_{i,t}$ includes (strictly) exogenous variables; α_i and τ_t are country- and time-fixed effects; and $u_{i,t}$ are i.i.d error terms. Model (1) is estimated for an unbalanced panel data sample of at most 31 and at least 18 SSA economies. As an illustration, we also estimate the same specification for other four country groups (see Table B, Annex I): (i) the world sample, here containing 128 countries; (ii) LICs; (iii) EMDEs, excluding the SSA countries; and (iv) AEs.¹⁵

Our baseline specification and econometric estimator is based on Grigoli, Herman, and Schmidt-Hebbel (2018). Different from them, however, we exclude the *real deposit rate* and the *old dependency ratio* from our baseline estimation.¹⁶ *Real deposit rate* is excluded from the baseline since we contemplate bank deposits as one of the main *components* of private savings in SSA, and not a an explanatory variables for savings per se.¹⁷ *Old dependency ratio* is further excluded given its high correlation with the share of urban population in SSA and, so, given the multicollinearity effect that it causes in the estimations.

Our specification, hence, includes the following variables: *lagged dependent variable*; *log of real per capita GDP in PPP terms*; *real growth rate of per capita GDP in PPP terms*; *annual inflation rate*; *flow of private sector credit in percent of GDP*; *public saving in percent of GDP*; *terms of trade*; and *the share of urban population*. In line with Loayza et al. (2000) and Grigoli, Herman, and Schmidt-Hebbel (2018), we assume that the first six explanatory variables are endogenous and correlated with present, past, or future error terms.¹⁸ We treat the two final covariates as exogenous variables.

All variables are based on the literature on savings and consumption theory and discussed in detail in Grigoli, Herman, and Schmidt-Hebbel (2018) and Loayza et al. (2000), for example.¹⁹ The *lagged dependent variable* captures its dynamics and inertia, which are likely to be an important factor given that changes in private saving generally occur over a long period of time depending on adjustment costs, consumption habits, and consumption smoothing. The *income variables* test whether higher growth and

¹⁵ Notice that testing for statistical differences for the coefficients of each variable for each country sample is beyond the scope of this analysis.

¹⁶ We also do not include *international oil prices* in our estimations as those authors do since we incorporate time-fixed effects in all our estimations. Those time-fixed effects already capture the time-varying effects of international oil prices.

¹⁷ Both variables are tested as potential additional covariates in our next subsection. The variable *bank deposits*, in turn, is used as one of our robustness checks in Section 6 by replacing our baseline dependent variable.

¹⁸ All tables reporting the econometric results indicate again which variables are assumed to be endogenous and exogenous in the estimations.

¹⁹ A more detailed description of how each variable is constructed is available upon request to the authors.

income lead to higher private savings. On *income growth* while the Harrod-Domar growth model (Harrod, 1939; and Domar, 1946) predicts the causality going from private savings to economic growth, Elbadawi and Mweza (2000) perform a series of causality tests for the SSA sample of economies indicating that in SSA the causality direction is the reverse, from economic growth to private savings.

Inflation, in turn, can have an ambiguous effect on private savings. On the one hand, it may corrode the purchasing power of consumers, leading to depletions in private savings. On the other hand, such loss of purchasing power and the higher macroeconomic uncertainty may call for higher precautionary savings.²⁰ The *flow of private sector credit ratio to GDP* intends to capture domestic borrowing constraints, whose relaxation, theoretically, could lead to a fall in private savings. Concerning the effect of *public savings*, it is expected to be negative given the Ricardian equivalence hypothesis (REH), which predicts that an increase in permanent government consumption (or depletion in public savings) is fully offset by lower private consumption (or higher private savings).

Terms-of-trade (TOT) movements change the overall income in countries and can impact private savings. Agénor and Aizenman (2004) show that the impact of those changes is asymmetric. In SSA they estimate the impact of *TOT* moves to be positive, leading to higher private saving rates. Finally, the effect of a higher *urbanization rate* of the population should be consistent with (i) larger consumption opportunities in urban areas; (ii) a younger population who lives in cities, and (iii) higher precautionary savings in rural areas due to larger uncertainty from volatile agricultural income, leading to lower private saving rates.

The choice of Equation's (1) estimator should take two major issues into consideration: (i) the inclusion of the unobserved country-specific effects; and (ii) the possibility that the model contains endogenous variables. Moreover, the inclusion of the lagged dependent variable among the regressors makes this a dynamic panel, with a small T (number of years) and large N (number of countries).

The standard estimator for such a dynamic panel model with country-specific effects and endogenous variables is the generalized method of moments (GMM) estimator. There are two types of GMM estimators: (i) the difference GMM estimator; and (ii) the system GMM estimator. The first-differenced GMM estimator introduced by Arellano and Bond (1991) uses the following moments:

$$E[(\varepsilon_{i,t} - \varepsilon_{i,t-1})\Omega_{i,t-j}] = 0, j \geq 2,$$

where $\Omega_{i,t-j}$ denotes a set of lagged explanatory variables used as instruments for the first-differenced equation. Besides the moment conditions given by the equation above, Arellano and Bover (1995) and Blundell and Bond (1998) propose to use additional moments, where the lagged first differences of the variables are used as instruments for the level equation:

$$E[\varepsilon_{i,t}\Delta\Omega_{i,t-j}] = 0, j \geq 1.$$

When the moment conditions of the two equations above are used in the estimation, that leads to a 2-Stage System GMM estimator with more efficient estimates (Arellano and Bover, 1995; and Blundell and Bond, 1998). The 2-Stage System GMM estimator presents superior finite sample properties in terms of

²⁰ Aizenman, Cavallo, and Noy (2015) indicate, however, that the relationship between economic uncertainties and precautionary savings is not always clear cut in developing economies. We further test for the effects of economic uncertainty and unanticipated inflation (and growth) in the next section.

unbiasedness and precision than the first-differenced GMM and Within Group (OLS) estimators (Bond, Hoeffler, and Temple, 2001).

Therefore, similar to Lledó and Poplawski-Ribeiro (2013) and Grigoli, Herman, and Schmidt-Hebbel (2018), we use two different econometric methodologies to estimate Model (1) throughout the paper. The first is the simple Ordinary Least Squares with Fixed Effects (OLS FE), which is included to illustrate the estimation results with a simple estimator.

The second, which is our preferred estimator given the econometric issues discussed above, is the Two-stage System Generalized Method of Moments (see Blundell and Bond, 1998; and Roodman, 2006). Again, this latter method estimates Equation (1) in first differences, implying that the impact of changes in the control variables are estimated on changes in the particular private savings rate change. When using this method, we also calculate robust standard errors to avoid heteroskedasticity, owing to potential measurement errors in the savings rate, particularly in SSA. The R-squared statistic is not reported because in instrumental variable (IV) estimations that statistic is no more bounded between 0 and 1 (Baum Schaffer, and Stillman, 2003). Instead, the F test of overall model fit is reported together with the Hansen test of overidentified restrictions and the Arellano-Bond test of first and second-order serial correlations in first differences (Roodman, 2006). Moreover, the difference-in-Hansen test is also performed to check whether instruments are exogenous (Roodman, 2007). Finally, the Stata command *collapse* is further employed to limit instrument proliferation and improve the estimations (Roodman, 2006).

Data

Data are collected or calculated from 1980 until 2021 for more than 133 countries, characterizing our initial full sample. Most of the macroeconomic variables are obtained from Grigoli, Herman, and Schmidt-Hebbel's (2018) database and augmented up to 2021 using the *World Economic Outlook* (WEO) and the *World Development Indicators* (WDI) databases (published version in April 2021). Those databases are further combined among themselves or with other databases to increase specific variables coverage and make the panel data sample more balanced. For example, missing values for *TOT* coming from the WEO database are filled with data from Gruss, Nabar, and Poplawski-Ribeiro (2020) when available. Annex I reports the country sample used in the estimations. Annex II reports the descriptive statistics of all variables used in the SSA estimations.

Outlier treatments are further employed to create the estimation samples. Countries with less than one million people in 2020 are excluded from the estimated sample. Data for Zambia between 2020 and 2021 are also excluded given their outlier values for private savings. Our outlier treatment further excludes country-year observations that indicates persistent highly positive or highly negative inflation, a characteristic present in many emerging economies, in particular in SSA (Baldini and Poplawski-Ribeiro, 2011). That is done by trimming country-year observations of the consumer price index (CPI) that were above the top fifth percentile or below the bottom fifth percentile of the initial full sample data distribution.

The data calculations and outlier treatments lead to a full unbalanced panel data sample for the SSA of at most 31 countries during the sample period with 986 observations in the baseline regression. The full (world) sample contains 128 countries with 3,619 observations. These statistics, including for the other country group samples estimated, are displayed in each of the tables reporting the estimations results.

Baseline Results

Table 1 portrays the estimation results for different samples: SSA economies (the main focus of our paper), the full sample, LICs, EMDEs (excluding SSA), and AEs. Beyond their coefficients and t-statistics, the table presents the results of all regression statistical tests as well as the number of observations, minimum observations per country, and number of countries. The regressions tests confirm the goodness of fit and validity of the regressions with significant F-test and high R-squareds for the OLS-FE regressions. The other econometric tests for the 2-stage system GMM further corroborate the estimator, instruments and econometric strategy pursued.

For the sample of SSA economies, although the volatility on its series, the baseline estimation of Equation (1) using the 2-stage system GMM estimator confirms that *real per capita economic (GDP) growth* is one of the main historical determinants of private saving rates.²¹ This is in line with Elbadawi and Mwega (2000), who suggest that (i) the causality direction in SSA runs from economic growth to private investments (and savings); and (ii) African economies lag behind in terms of private savings because of their low growth of per capita incomes (see also Shawa, 2016). The coefficient in Column (2) shows that a one percentage point increase in the annual *real per capita GDP growth* raises the private saving rate, on average, by 0.46 percentage points, which is almost twice more than the average annual change in private savings rates in SSA over the period 1983–2019 (Table C, Annex II).

For the full sample, five other variables instead are statistically significant in the baseline estimation using the 2-stage system GMM estimator. These are: the *lagged dependent variable*; the *natural log of the real per capita GDP*; *terms of trade*; *inflation*; and *public saving over GDP*. While the former three variables display estimated positive coefficients, the latter two present *negative* coefficients in Table 1. So, for the full sample, the coefficient of the lagged dependent variable indicates that private savings rates are *inertial*. They are also positively associated with higher *level of per capita incomes (GDP)*. Moreover, households in the full sample appear to save a fraction of their increased income induced by *TOT* shocks potentially given their temporary nature. For the full sample, inflation is negatively associated with private savings rates given its effects on consumers' purchasing power.²² In line with the REH, *public savings* have a negative coefficient, indicating that expansions on fiscal policy and public debt could lead households to save more in order to offset potential increases in taxation in the future. As in other papers in the literature, the coefficient value (-0.34) shows, however, that such offset is only partial, even when considering the degree of persistency (lagged dependent variable) on private savings.

For the other samples (LICs, EMDEs excluding SSA economies, and AEs) presented in Table 1, no coefficient is estimated as statistically significant. Although, again, testing for statistical differences among the coefficients of each variable for each country sample is beyond the scope of our analysis; those results indicate how restrictive the GMM estimator is and the potential multicollinearity existent in the data for those samples.

Next section investigates additional variables identified in consumption theory and empirical literature as other potential determinants of private savings, including *labor informality* and *conflicts*.

²¹ As it will be shown later, the variable is also significant when it is analyzed using GDP, i.e., *real per capita GDP growth*.

²² Again, theoretically, inflation could have ambiguous effects on savings given the uncertainty it provokes on consumers that could lead to precautionary savings.

Table 1. Estimation of Main Savings Determinants, 1983–2021

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	SSA economies		Full Sample ^a		LICs ^a		EMDEs (excluding SSA) ^a		Advanced economies ^a	
	OLS FE	2-st. Sys-GMM ^b	OLS FE	2-st. Sys-GMM ^b	OLS FE	2-st. Sys-GMM ^b	OLS FE	2-st. Sys-GMM ^b	OLS FE	2-st. Sys-GMM ^b
Constant	-7.947 (-1.204)		-12.885** (-2.116)		-10.049 (-1.260)		-15.628* (-1.763)		-55.367*** (-3.457)	
Lag dependent variable	0.509*** (11.388)	0.433 (0.677)	0.575*** (14.747)	0.451*** (8.018)	0.449*** (-9.819)	0.113 (-0.367)	0.605*** (12.531)	0.401 (1.486)	0.614*** (10.362)	-0.951 (-0.648)
Ln real per capita GDPi (PPP)	0.026*** (3.856)	-0.005 (-0.020)	0.013** (2.562)	0.032*** (3.051)	0.023*** (-2.739)	0.005 (-0.159)	0.006 (1.254)	0.013 (0.462)	0.050*** (3.534)	0.034 (0.077)
Real growth rate of per capita GDPi (PPP)	0.112 (1.625)	0.459* (1.834)	-0.000 (-0.940)	-0.000 (-0.127)	-0.000*** (-3.230)	0.000 (-0.171)	-0.000*** (-9.008)	-0.000 (-0.075)	-0.000* (-1.816)	0.000 (0.680)
Ln terms of trade	0.004 (0.421)	0.002 (0.003)	0.033*** (3.032)	0.035* (1.917)	0.011 (-1.037)	-0.089 (-0.781)	0.048*** (2.850)	0.126 (1.102)	0.050*** (2.949)	-0.403 (-0.367)
Inflation	-0.030 (-0.851)	0.949 (0.589)	-0.001*** (-2.691)	-0.004** (-2.318)	-0.048 (-1.633)	0.122 (-0.794)	-0.000 (-0.958)	-0.000 (-0.101)	0.059 (1.305)	0.570 (0.386)
Flow of private sector credit/GDPi	0.059 (0.546)	0.124 (0.013)	0.029* (1.875)	0.017 (0.403)	0.084 (-0.907)	-0.462 (-0.232)	0.021 (0.735)	-0.040 (-0.254)	-0.007 (-0.618)	0.030 (0.066)
Share of urban population	-0.135 (-1.110)	0.238 (0.164)	-0.073 (-1.458)	-0.018 (-0.321)	-0.072 (-0.436)	1.754 (-0.911)	-0.076 (-1.475)	0.013 (0.093)	-0.054 (-0.721)	2.661 (0.512)
Public saving/GDPi	-0.348*** (-5.794)	-1.352 (-1.146)	-0.239*** (-5.135)	-0.341*** (-4.091)	-0.404*** (-6.340)	-0.247 (-0.190)	-0.162** (-2.548)	-0.277 (-1.526)	-0.209*** (-5.207)	-0.371 (-0.392)
R-squared	0.57		0.49		0.52		0.49		0.76	
Adj R-squared	0.58		0.67		0.54		0.64		0.72	
F test value		163.7		104.4		170.5		1.9		716.7
F-test p-value		0.000		0.000		0.000		0.007		0.000
Arellano-Bond test for AR(1) in first differences (p-value)		0.186		0.000		0.538		0.042		0.569
Arellano-Bond test for AR(2) in first differences (p-value)		0.398		0.867		0.113		0.834		0.427
Hansen J-test or instrument validity (p-value) ^f		1.000		1.000		1.000		1.000		1.000
Sargan test of overidentifying restrictions (p-value)		0.000		0.000		0.000		0.000		0.000
Observations	986	986	3,619	3,619	1,250	1,250	1,742	1,742	891	891
Minimum observations per country	11	11	7	7	7	7	7	7	17	17
Number of Countries	31	31	128	128	43	43	66	66	31	31

Sources: WEO database; WDI database; Grigoli et al. (2018); Gruss et al. (2020); and authors' estimations.

Notes: All estimations include country- and time-fixed effects with t-statistics (reported in parentheses) estimated using robust standard errors. Significance at *** p<0.01; ** p<0.05; * p<0.10.

Countries below one million people in 2020 are excluded from the sample. The data sample also exclude country-year data points above the 95th and below the 5th percentiles of *price index distribution*. ^a The *real growth rate of per capita GDPi* in the estimation is trimmed to below the 99th and above the 1st percentiles of the sample distribution given large outliers. ^b 2-stage-System GMM estimations use a collapsed instrument matrix and perform the Windmeijer (2005) correction of the covariance matrix. The constant is omitted in the 2-stage system GMM estimations owing to their collinearity with the fixed effects. ^c The null hypothesis for the Hansen J-test is that the full set of instruments is valid.

SSA = sub-Saharan Africa. LICs = low income countries. EMDEs = emerging markets and developing economies.

Testing Other Savings Determinants Across Income Groups

This section augments Equation (1) with additional variables that potentially may be associated with private savings. Accordingly, Equation (1) is modified as follows:

$$savings_{it} = \delta savings_{i,t-1} + \theta X_{i,t} + \vartheta Z_{i,t} + \sigma test_variable_{i,t} + \alpha_i + \tau_t + \varsigma_{i,t}, \quad (2)$$

where $test_variable_{i,t}$ indicates the additional explanatory variable estimated. The other variables and vectors $X_{i,t}$ and $Z_{i,t}$ include the same covariates used in Equation (1). Equation (2) is estimated just for the SSA sample of economies and only the results using the 2-stage system GMM estimator are reported in the paper.²³ Another departure from Equation (1) is that in the estimation of (2), some of the sample periods used are shorter than 1983–2021, given data availability for the variable tested. For our proxy of *labor informality*, for example, the sample period is 1991–2017.

For the selection of the additional covariates, we follow closely the tests performed in Grigoli, Herman, and Schmidt-Hebbel (2018) and some other savings hypotheses more relevant to SSA economies. Those new covariates are introduced in the estimations one by one and in alphabetical order. Tables 2a and 2b display the results. Hence, the first tested variable is a dummy for country-years in *conflict* (Column 1 of Table 2a), valuing one in years of conflicts in a particular country i . It tests whether *conflicts* lead to precautionary savings or forced savings through foregone consumption, as suggested by some previous estimations in the literature (Torres-Garcia, Vanegas-Arias and Builes-Aristizabal, 2019).²⁴ Data for the variable come from the Uppsala Conflict Data Program (UCDP). Its descriptive statistics highlights the prevalence of *conflicts* in the region.²⁵

The second variable tested is the *current account balance* (as percent of GDP). A deficit in the *current account* may signal external borrowing constraints, particularly when countries face a binding quantitative restriction in its access to foreign funding. Such borrowing constraint implies less external access by consumers and the overall economy to credit leading, therefore, to private savings. The third variable tested is the *real deposit rate*, which is a proxy for financial deepening in our sample of SSA economies. Financial deepening reflected in increased financial assets (here higher deposit rates) could provide the financial instrument for households raising savings. To test for the effects of the forward-looking income, the fourth additional variable checked is the *five-year ahead-forecast of real GDP growth*, which may be relevant to individual's saving-consumption behavior as described again by the Life Cycle Hypothesis (LCH) and the Permanent Income Hypothesis (PIH). The next variable tested is the ratio of foreign aid to GDP. Foreign aid could have an impact on saving. For example, if foreign aid is used to smooth out consumption, it could have a crowding out effect on domestic

²³ Econometric results for other country samples or using the OLS-FE are available upon request to the authors.

²⁴ Those authors report a statistically significant and negative association of *conflicts* with *national savings*. Novta and Pugacheva (2021), in turn, point to a negative association between *conflicts* and *national and households' incomes*. Micro-level data and field experiments also indicate that *conflicts* can decrease *savings* (Voors and others, 2012).

²⁵ Table C in Annex II shows that *conflicts* were prevalent on average in 3 percent of the country-years of our SSA estimated sample.

private saving (Elbadawi and Mweya, 2000). Foreign aid inflow may also act as a substitute to domestic savings by easing liquidity constraints or by inducing Dutch disease effects.

The sixth additional variable tested in Equation (2) is *labor informality*. Theoretically, such variable has an ambiguous effect on private savings because the higher uncertainty of job- and income security in the informal market may trigger precautionary savings in the worker. Furthermore, informal workers tend to have lower income than formal ones, impacting their consumption and saving capacity, particularly in lower-income economies such as many in SSA. As a measure of *informality*, we use the annual shares of the informal sectors on total GDP of SSA economies estimated by Medina and Schneider (2020). Those authors estimate time-varying shares at annual frequency for 157 countries between 1991 and 2017.

The next four variables tested—the first two in Table 2a (Columns 7 and 8) and the last two in Table 2b (Columns 9 and 10)—are the *permanent* and *temporary component of the GDI and terms of trade*, respectively. Those variables are calculated by applying a Hodrick-Prescott filter with the smoothing parameter $\lambda = 6,25$, standard for annual data frequency. The four components may lead to different associations with private savings, given the PIH and LCH theories. Accordingly, *temporary or cyclical increases in the terms of trade and incomes* (here proxied by GDI), like the current increase in oil prices for oil exporters, should lead to higher savings than permanent increases. Permanent hikes in those two variables could lead to a larger increase in consumption of households and of the countries, instead.

Two demographic variables test the LCH theory by including two age dependency ratios: *old-age dependency ratio* and *young-age dependency ratio*. The LCH predicts a hump-shaped saving-age pattern with an increase in the *old-age dependency ratio* leading to a reduction in *private saving rates*. *Young dependency ratios*, reversely, could lead to an increase in *private saving rates*. We also test these two variables combined in a regression.

Two other variables tested are measures of unanticipated income and inflation. SSA households have more uncertain income prospects than households in AEs. Thus, those two variables attempt to study unanticipated income and inflation effects. For this exercise, unanticipated income growth is proxied by the second difference of the log of income, and unanticipated inflation by the second difference of the log of the CPI index. If income uncertainty has a positive effect on private savings, this could suggest that precautionary savings are at play in SSA sample.

The final variable tested is Economic Uncertainty. According to the income uncertainty hypothesis, economic uncertainty could have a positive effect on private savings. Thus, for that, we use yearly averages of the quarterly World Uncertainty Index (Ahir, Bloom and Furceri, 2022) available for all SSA economies.

The results of the estimations adding the covariates above (one per estimation) show that none of the additional variables tested are statistically significant for SSA in our estimations. In Tables 2a and 2b we can see that the period sample varies depending on the data availability for the variable tested and that only the 2-Stage System GMM estimations are displayed. The regression statistics of all tests performed (in all columns) also point to significant and correctly instrumented regressions. Yet, surprisingly, no new added variable is significant, including *conflict*, *labor informality*, the *temporary* and *permanent components of TOT*, or *economic uncertainty*. This is likely due to multicollinearity of these variables with some of the other covariates included in the baseline specification.²⁶

²⁶ For example, for *conflict* a potential negative correlation between that variable and *TOT* (via commodity prices shocks; see Dube and Vargas, 2013) could be a reason for the non-statistically significant effect.

In terms of the baseline explanatory variables, *real per capita GDP growth* and four other variables show up statistically significant in some of the regressions of Tables 2a and 2b. *Real per capita GDP growth* is significant in Columns (4), (9), and (15) to (17) testing the variables *five-year ahead GDP growth forecast*, the *permanent component of TOT*, *economic uncertainty*, and the effects of *unanticipated income* and *inflation*. The other four baseline explanatory variables statistically significant in Tables 2a and 2b are: the *lagged dependent variable*, the *log of real per capita GDP*; *flow of private sector credit (over GDP)*; the *share of urban population*; and *public saving over GDP*. Beyond the *real per capita GDP growth*, the coefficient for *public savings* is the one significant in more regressions (Columns 1, 7, and 15 to 17). These results corroborate the REH notably when country-years of *conflict* is tested and GDP is analyzed at its permanent component.

In sum, the results of this sub-section suggest that the baseline specification of Equation (1) includes the necessary variables relevant for the analysis of private savings in SSA economies. Next section will check whether variables attempting to capture the impact of COVID-19 are significant in explaining *yearly changes* in the private savings rate.

Table 2a. Additional Determinants of Savings, 1983–2021

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Lag dependent variable	0.978 (1.008)	-0.443 (-0.564)	-1.347 (-0.825)	-0.179 (-0.239)	2.223 (0.813)	-0.582 (-0.724)	-0.654 (-0.579)	0.496*** (4.315)
Ln real per capita GDP (PPP)	0.147 (0.991)	0.098 (1.177)	-0.193 (-0.848)	-0.125 (-0.990)	0.187 (0.786)	0.059 (0.228)		
Real growth rate of per capita GDP (PPP)	-0.270 (-0.230)	0.588 (1.539)	-1.413 (-0.925)	0.645** (2.175)	0.015 (0.024)	0.105 (0.590)	-0.248 (-0.633)	-0.207 (-0.928)
Ln terms of trade	-0.181 (-0.654)	-0.342 (-1.022)	0.543 (1.196)		-0.224 (-0.588)	0.366 (1.400)	0.147 (0.348)	-0.011 (-0.210)
Inflation	5.784 (0.281)	0.936 (0.687)	-0.731 (-0.788)	0.001 (0.986)	0.954 (0.772)	-0.706 (-0.782)	-0.778 (-0.424)	-0.373 (-1.637)
Flow of private sector credit/GPDI	2.553 (0.480)	-1.124 (-0.697)	-2.380 (-0.833)	1.967 (0.703)	-1.555 (-0.626)	-3.163 (-0.982)	0.000 (0.998)	0.156 (0.337)
Share of urban population	-0.121 (-0.094)	3.175 (0.993)	-1.572 (-0.864)	2.348 (1.098)	-0.971 (-1.202)	-0.144 (-0.210)	0.550* (1.917)	-0.048 (-0.242)
Public saving/GPDI	-3.171* (-1.728)	0.267 (0.416)	-2.654 (-1.294)	-0.614 (-0.902)	-4.017 (-0.804)	0.306 (0.361)	-0.591** (-2.681)	0.869 (0.869)
Conflict dummy ^{a,b}	44.347 (0.780)							
Current account balance as percent of GPDI ^a		-5.255 (-0.652)						
Real deposit rate ^c			-3.044 (-0.977)					
5-year forecast of real GDP growth ^a				45.017 (1.111)				
Foreign aid as percent of GPDI ^a					0.473 (0.434)			
Informal sector as percent of GDP ^c						-4.384 (-1.600)		
Log of permanent component of GPDI ^a							-4.283 (-0.296)	
Log of temporary component of GPDI ^c								1.882 (0.768)
F test value	117.2	78.9	190.0	179.7	63.89	129.4	1,405.0	1,419.0
F-test p-value	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Arellano-Bond test for AR(1) in first differences (p-value)	0.307	0.176	0.256	0.208	0.282	0.221	0.119	0.124
Arellano-Bond test for AR(2) in first differences (p-value)	0.327	0.493	0.516	0.719	0.448	0.062	0.689	0.845
Hansen J-test or instrument validity (p-value) ^d	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Sargan test of overidentifying restrictions (p-value)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Observations	1,064	986	623	840	929	745	889	499
Minimum observations per country	15	11	5	2	11	11	8	2
Number of Countries	32	31	28	33	30	31	31	30
Period sample	1983-2021	1983-2021	1983-2020	1990-2021	1983-2021	1991-2017	1983-2021	1983-2021

Sources: WEO database; WDI database; Grigoli et al. (2018); Gruss et al. (2020); and authors' estimations.

Notes: All estimations use 2 stage-System GMM estimations and include country- and time-fixed effects with t-statistics (reported in parentheses) estimated using robust standard errors. Significance at *** p<0.01; ** p < 0.05; * p < 0.10. Countries below one million people in 2020 are excluded from the sample. The data sample also exclude country-year data points above the 95th and below the 5th percentiles of price index, unless stated otherwise. The constant is excluded from the excluded from the specification. The 2 stage-System GMM estimations use a collapsed instrument matrix and perform the Windmeijer (2005) correction of the covariance matrix. ^a New variable tested assumed as an exogenous instrument. ^b Estimation uses the inflation rate in decimal values without outlier treatment. ^c New variable tested assumed as an endogenous instrument. ^d The null hypothesis for the Hansen J-test is that the full set of instruments is valid.

Table 2b. Additional Determinants of Savings, 1983–2021

VARIABLES	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
Lag dependent variable	1.089 (1.382)	1.219 (1.213)	0.158 (0.080)	-1.125 (-0.993)	2.185 (0.685)	-3.046 (-1.409)	0.471*** (4.119)	0.378*** (3.070)	0.470*** (4.132)
Ln real per capita GDP (PPP)	-0.121 (-0.583)	0.085 (1.131)	0.051 (1.167)	-0.370 (-1.578)	-0.076 (-0.465)	0.210* (1.753)	0.044** (2.577)	0.032** (2.121)	0.037** (2.600)
Real growth rate of per capita GDP (PPP)	0.785* (1.901)	0.660 (1.318)	0.703 (0.555)	1.102 (1.641)	0.156 (0.384)	0.167 (0.566)	0.130** (2.394)	0.128** (2.222)	0.132** (2.327)
Ln terms of trade				0.484 (0.702)	-0.297 (-0.275)	1.596 (1.381)	-0.033 (-0.896)	0.026 (0.449)	-0.031 (-0.952)
Inflation	1.717 (1.023)	1.528 (0.823)	1.570 (0.581)	1.934 (1.094)	0.880 (0.518)	-0.597 (-0.654)	0.009 (0.128)	-0.101 (-1.264)	-0.014 (-0.212)
Flow of private sector credit/GDP	0.066 (0.013)	0.631 (0.328)	1.805 (0.291)	-2.322 (-0.796)	-4.119 (-1.331)	-5.967* (-1.729)	-0.283 (-1.081)	-0.243 (-0.823)	-0.168 (-0.565)
Share of urban population	0.276 (0.324)	0.528 (0.974)	-0.957 (-0.497)	0.916 (0.555)	0.831 (0.220)	-7.283 (-1.565)	0.326** (2.566)	0.242** (2.609)	0.307** (2.543)
Public saving/GDP	-1.764 (-1.208)	-1.532 (-1.288)	0.057 (0.158)	1.155 (0.828)	-3.839 (-0.737)	3.269 (1.205)	-0.390*** (-3.766)	-0.316*** (-2.365)	-0.376*** (-3.598)
Permanent component of terms of trade ^a	0.138 (0.389)	-0.182 (-1.268)							
Temporary component of terms of trade ^a		0.226 (1.204)	1.556 (0.902)						
Old-age dependency ratio ^a				1.577 (0.043)		2.257 (0.052)			
Young-age dependency ratio ^a					2.003 (0.403)	-7.436 (-1.464)			
Unanticipated income growth ^{a, d}							-7.097 (-0.544)		
Unanticipated inflation ^{a, d}								14.401 (1.514)	
Uncertainty ^a									1.499 (0.287)
F test value	122.8	72.6	199.0	161.5	479.3	89.34	183.1	69.61	55.60
F-test p-value	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Arellano-Bond test for AR(1) in first differences (p-value)	0.144	0.262	0.434	0.197	0.208	0.000	0.005	0.010	0.007
Arellano-Bond test for AR(2) in first differences (p-value)	0.978	0.789	0.461	0.198	0.535	0.415	0.915	0.941	0.978
Hansen J-test or instrument validity (p-value) ^b	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Sargan test of overidentifying restrictions (p-value)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Observations	986	986	986	986	986	986	986	985	986
Minimum observations per country	11	11	11	11	11	11	11	11	11
Number of Countries	31	31	31	31	31	31	31	31	31
Period sample	1983-2021	1983-2021	1983-2021	1983-2021	1983-2021	1983-2021	1983-2021	1983-2021	1983-2021

Sources: WEO database; WDI database; Grigoli et al. (2018); Gruss et al. (2020); and authors' estimations.

Notes: All estimations use 2 stage-System GMM estimations and include country- and time-fixed effects with t-statistics (reported in parentheses) estimated using robust standard errors. Significance at *** p<0.01; ** p < 0.05; * p < 0.10. Countries below one million people in 2020 are excluded from the sample. The data sample also exclude country-year data points above the 95th and below the 5th percentiles of price index, unless stated otherwise. The constant is excluded from the excluded from the specification. The 2 stage-System GMM estimations use a collapsed instrument matrix and perform the Windmeijer (2005) correction of the covariance matrix. ^a New variable tested assumed as an exogenous instrument. ^b Estimation uses the inflation rate in decimal values without outlier treatment. ^c New variable tested assumed as an endogenous instrument. ^d Estimation excludes time fixed-effects. ^e The null hypothesis for the Hansen J-test is that the full set of instruments is valid.

Savings Determinants during COVID-19

Beyond the historical determinants of the private savings rate across SSA and other world regions, another main objective and innovation of this paper is to investigate how the COVID-19 pandemic has affected *changes* in the savings rate in those regions. By now, it is clear that the pandemic brought a shock to several economic indicators across the globe, particularly in SSA (Miguel and Mushfiq Mobarak, 2021). But no research has looked at the COVID-19 impact for private savings in SSA economies.²⁷

Our hypothesis is that COVID-19 pandemic could have three main effects on SSA households, leading to an ambiguous effect of the pandemic on private savings *ex ante* and calling for an econometric investigation of that effect. First, the loss of income caused by the pandemic related economic recession may have led households to deplete their savings, notably those with low levels of income or hand-to-mouth consumers.

²⁷ Again, for the impact of COVID-19 on households' savings in the Euro Area and for all AEs and some large EMs, see McGregor et al. (2022), and IMF (2021b), respectively.

Second, the pandemic and the associated economic uncertainty may have led to higher precautionary savings among SSA households, contributing to an overall increase in private savings. Third, the severity of the preventive measures to slowdown the dissemination of the virus in SSA countries may have pushed high-income households (or for those that have not lost jobs or their income source during the pandemic) to foregone consumption or *forced* savings, contributing to an increase in private savings rates (IMF, 2021b) as well. The emergence of COVID-19 vaccines in 2021 and its (scarce) dissemination in SSA may have intensified further those effects.

We investigate empirically those hypotheses to better understand the impact of COVID-19 on private savings in SSA at the macro level. For that, first, we create proxies capturing the *dissemination* and *mortality of COVID-19* in the regions investigated and estimate their impact on private savings rates in the next subsection. Second, the subsequent sub-section analyzes the hypothesis of *forced* savings, attempting to estimate the impact of *COVID-19 preventive measures* on *private savings*. Finally, given its importance for the solution of the pandemic (Agarwal and Gopinath, 2021) and potentially for households' saving behavior, the final sub-section examines the impacts of *vaccine shots* (as percent of the population) on *private savings* at the macro level.

Estimating COVID-19's Impact on the *Change* in Private Saving Rates

We estimate the COVID-19's impact on savings at the macro-level by looking at the *change (first-difference)* of the private savings ratio GPD to proxies capturing the effects of the pandemic. Thus, Equation (1) is rewritten in *first differences*, having two distinct specifications one for each of the two proxies for COVID-19: the number of reported *cases* and *deaths* (per million people in each country):

$$\Delta savings_{i,t} = \pi \Delta savings_{i,t-1} + \phi X_{i,t} + \delta Z_{i,t} + \omega covid_cases_{i,t} + \alpha_i + \tau_t + \varepsilon_{i,t}, \quad (3)$$

or

$$\Delta savings_{i,t} = \pi \Delta savings_{i,t-1} + \phi X_{i,t} + \delta Z_{i,t} + \omega covid_deaths_{i,t} + \alpha_i + \tau_t + \varepsilon_{i,t}, \quad (4)$$

where Δ symbols the first-difference operator (e.g., $\Delta savings_{i,t} = savings_{i,t} - savings_{i,t-1}$); and $covid_cases_{i,t}$ and $covid_deaths_{i,t}$ correspond to the *annual* numbers of cases and deaths due to COVID-19, respectively, per million people in each country sampled. All other variables and econometric techniques employed in the estimations are similar to those employed in Equation (1).

The *numbers of COVID-19 cases* and *deaths* come from the World Health Organization. They are obtained from the *ourworldindata.org* website (see Ritchie et al., 2020; and Mathieu et al., 2021) at monthly basis and aggregated at annual frequency for 2020 and 2021. The annual data are then divided by each country's population coming from the WEO and multiplied by million to obtain the number of cases and deaths per each country's million people in each year. The list of countries used in the estimations of Equations (3) and (4) are reported in Table B of Annex I. The descriptive statistics of the COVID-19-related variables as well as the *first difference of private saving rates* are displayed in Table C of Annex II. The average number of COVID-19 cases between 2020 and 2021 was 4,190 per million people and the number of deaths 59 per million people in the 13 SSA economies included in the estimation samples of Equations (3) and (4).

Given the potentially ambiguous effects of COVID-19 on private savings rates, we do not have a prior on the sign of the coefficient ω for the COVID-19 variables in Equations (3) and (4). Moreover, a great econometric advantage of those two variables is that they are in principle strictly exogenous to private saving rates. Another interesting aspect of their construction is that they provide values to the effects of the pandemic that vary

across countries and years (2020 and 2021), bringing an important variation on the COVID-19 effects, which sometimes are still measured by time dummies in some of the studies.

One potential caveat to the estimation of those variables, as discussed in Section 2, is the fact that, for several reasons, *COVID-19 cases* and *deaths* have been misreported across the world, though. Such misreporting introduces a downward bias in the estimations of the coefficient ω in (3) and (4) (see, for example, Hausman, 2001) and indicates that any estimation of it in those equations will represent a lower bound to the effects of *COVID-19 cases* and *deaths* on *private savings* in the region.¹

The estimation results indicate that for the system GMM estimations the number of COVID-19 deaths is statistically significant and negatively associated with a *change* in the *private savings rate* in SSA. Tables 3 and 4 display the estimation results of Equations (3) and (4), respectively for the period sample 2017–2021, which we think that is a more relevant period sample to analyze the effects of COVID-19 in the data. Regarding the country samples, Tables 3 and 4 omit the sample of AEs, given that the number of observations is too low for this country sample to use the 2-Stage System-GMM estimator. The tables further include a new row as compared to Table 1, in which the estimated coefficient ω of Equation (3) or (4) is reported. That row (highlighted in bold) shows a (marginally) significant and negative coefficient in the two-stage System GMM estimations for the *number of COVID-19 deaths per million people in each country* for the SSA sample of economies in Table 4. The economic significance of that estimated coefficient is relatively high. It suggests that if a SSA country has 30 *COVID-19 deaths per million people* (that again could be seen as a proxy of COVID-19's mortality rate) in a particular year—which is close to the increase in deaths necessary to move the COVID-19 mortality rate in a country from the bottom quartile to the top quartile of that variable's distribution for our SSA sample between 2020 and 2021—*ceteris paribus* and on average, the *private savings rate* would have declined on average by 0.6 percentage points of GDP in that SSA economy in that year. Such a predicted change in the *private saving rate* is close to the average *change (first-difference)* of the *private savings rate* between 2020 and 2021 (see Table C in Annex II).

The estimation results for the coefficient of *COVID-19 cases per million people in the country* in Equation (3) are not statistically significant when using the 2-Stage System GMM estimator. That outcome is reported in Table 3. Taken together both results suggest that the COVID-19 mortality influenced economic agents' (negative) behavior towards private savings. While COVID-19 cases were not statistically associated with a decline in private savings, deaths caused by COVID-19 led to SSA economic agents to dissave. So, measures to attenuate COVID-19 mortality or its severity on the health of economic agents should be more effective in reducing the effect of the pandemic in private saving rates in SSA.

Stringency of COVID-19 Preventive Measures

Our next analysis focuses on the effects of the COVID-19 preventive measures—e.g., lockdowns, curfews, closure of different types of businesses, such as restaurants, bars, hotels etc.—on private saving rates in SSA economies. Some studies have already shown that the stringency of COVID-19 preventive measures may have an impact on private savings. McGregor et al. (2022), for example, claim that the large excess of household savings observed during the COVID-19 period in the Euro Area is related to the forced savings caused by preventive measures against the pandemic rather than by precautionary savings. Here, we perform a similar analysis to understand that dynamics in SSA.

¹ The time-fixed effects on Equations (3) and (4) further help in controlling for such potential effects of the misreporting.

Table 3. Private Savings and COVID-19 Cases per Countries' Million People, 2017–2021

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
	SSA economies		LICs ^a		EMDEs (excluding SSA) ^a	
	OLS FE	2-st. Sys-GMM ^b	OLS FE	2-st. Sys-GMM ^b	OLS FE	2-st. Sys-GMM ^b
Constant	47.255 (0.455)	-11.189 (-0.064)	116.112 (1.259)	27.076 (0.413)	-38.097 (-0.498)	-75.422** (-2.416)
Covid-19 cases per million inhabitants^c	-0.0002** (-2.473)	-0.000 (-1.020)	-0.000*** (-3.276)	-0.000 (-1.140)	-0.000* (-1.958)	-0.000 (-1.268)
Ln real per capita GDP (PPP)	-0.042 (-0.489)	-0.019 (-0.062)	-0.101 (-1.258)	0.004 (0.041)	0.011 (0.155)	0.124** (2.110)
Real growth rate of per capita GDP (PPP)	0.762*** (6.306)	0.812*** (3.656)	0.556*** (4.564)	0.550*** (3.290)	0.261** (2.122)	0.190* (1.692)
Ln terms of trade	0.012 (0.222)	0.005 (0.022)	-0.015 (-0.276)	-0.067 (-0.683)	0.165* (1.977)	0.059 (0.563)
Inflation (bounded)	0.527 (1.725)	0.219 (0.367)	0.449* (1.731)	0.571 (1.386)	0.208 (1.200)	-0.240 (-0.596)
Flow of private sector credit/GDP	-0.826*** (-3.241)	-1.638 (-1.321)	-0.438** (-2.620)	-0.265 (-0.790)	-0.079 (-0.823)	-0.177 (-0.710)
Share of urban population	-0.659 (-0.408)	0.702 (0.241)	-1.083 (-0.723)	0.115 (0.269)	-0.891 (-1.256)	-1.004* (-1.973)
Public saving/GDP	-0.151 (-0.621)	-0.443 (-0.549)	-0.349* (-2.017)	-0.595 (-0.690)	-0.100 (-0.464)	-0.153 (-0.616)
R-squared	0.60		0.51		0.21	
Adj R-squared	0.07		0.04		0.01	
F test value		6.29		2.36		1.53
F-test p-value		0.000		0.034		0.160
Arellano-Bond test for AR(1) in first differences (p-value)		0.015		0.007		0.011
Arellano-Bond test for AR(2) in first differences (p-value)		0.302		0.202		0.235
Hansen J-test or instrument validity (p-value) ^d		1.000		1.000		1.000
Sargan test of overidentifying restrictions (p-value)		0.417		0.000		0.842
Observations	79	79	105	105	147	147
Minimum observations per country	1	1	1	1	1	1
Number of Countries	20	20	26	26	36	36

Sources: WEO database; WDI database; Grigoli et al. (2018); Gruss et al. (2020); Ritchie et al. (2020); ourworldindata.org; and authors' estimations.

Notes: All estimations include country- and time-fixed effects with t-statistics (reported in parentheses) estimated using robust standard errors.

Significance at *** $p < 0.01$; ** $p < 0.05$; * $p < 0.10$. Countries below one million people in 2020 are excluded from the sample. The data sample also excludes country-year data points above the 90th and below the 10th percentiles of *price index* distribution since 1981.^a The *real growth rate of per capita GDP* in the estimation is trimmed to below the 99th and above the 1st percentiles of the sample distribution given large outliers.

^b 2-stage-System GMM estimations use a collapsed instrument matrix and perform the Windmeijer (2005) correction of the covariance matrix. The constant and other variables are omitted in some of the 2-system GMM estimations owing to their collinearity with the fixed effects.

^c New variable tested assumed as an exogenous instrument. ^d The null hypothesis for the Hansen J-test is that the full set of instruments is valid.

SSA = sub-Saharan Africa. LICs = low income countries. EMDEs = emerging markets and developing economies.

Table 4. Private Savings and COVID-19 Deaths per Countries' Million People, 2017–2021

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
	SSA economies		LICs ^a		EMDEs (excluding SSA) ^a	
	OLS FE	2-st. Sys-GMM ^b	OLS FE	2-st. Sys-GMM ^b	OLS FE	2-st. Sys-GMM ^b
Constant	51.056 (0.487)	-580.051 (-0.961)	111.349 (1.151)	-30.331 (-0.210)	-12.146 (-0.165)	-33.361 (-0.719)
Covid-19 deaths per million inhabitants^c	-0.010*** (-4.035)	-0.020** (-2.602)	-0.004 (-0.645)	-0.000 (-0.014)	-0.000 (-1.050)	-0.000 (-0.237)
Ln real per capita GDPi (PPP)	-0.050 (-0.601)	0.457 (0.892)	-0.101 (-1.228)	-0.011 (-0.153)	-0.035 (-0.511)	0.058 (0.709)
Real growth rate of per capita GDPi (PPP)	0.765*** (6.437)	0.625 (1.568)	0.564*** (4.728)	0.565*** (4.394)	0.282** (2.274)	0.262** (2.711)
Ln terms of trade	0.012 (0.221)	0.020 (0.109)	-0.022 (-0.409)	-0.074 (-0.336)	0.154* (1.804)	0.030 (0.466)
Inflation (bounded)	0.528* (1.814)	-0.378 (-0.322)	0.502* (1.864)	0.481 (1.489)	0.234 (1.331)	-0.048 (-0.116)
Flow of private sector credit/GPDI	-0.844*** (-3.518)	-1.736* (-1.872)	-0.387** (-2.203)	-0.396 (-1.391)	-0.060 (-0.593)	-0.190 (-0.686)
Share of urban population	-0.605 (-0.381)	7.377 (1.108)	-0.837 (-0.546)	2.171 (0.492)	-0.557 (-0.873)	-0.529 (-0.630)
Public saving/GPDI	-0.161 (-0.725)	-0.499 (-0.730)	-0.343* (-1.871)	-0.582 (-1.283)	-0.122 (-0.567)	-0.171* (-1.800)
R-squared	0.61		0.50		0.18	
Adj R-squared	0.07		0.04		0.13	
F test value	0.42		8.79		2.98	
F-test p-value	0.938		0.008		0.006	
Arellano-Bond test for AR(1) in first differences (p-value)	0.204		0.008		0.011	
Arellano-Bond test for AR(2) in first differences (p-value)	0.744		0.235		0.185	
Hansen J-test or instrument validity (p-value) ^d	0.407		1.000		1.000	
Sargan test of overidentifying restrictions (p-value)	0.000		0.514		0.000	
Observations	79	79	105	105	147	147
Minimum observations per country	1	1	1	1	1	1
Number of Countries	20	20	26	26	36	36

Sources: WEO database; WDI database; Grigoli et al. (2018); Gruss et al. (2020); Mathieu et al. (2021); ourworldindata.org; and authors' estimations.

Notes: All estimations include country- and time-fixed effects with t-statistics (reported in parentheses) estimated using robust standard errors.

Significance at *** p<0.01; ** p<0.05; * p<0.10. Countries below one million people in 2020 are excluded from the sample. The data sample also excludes country-year data points above the 90th and below the 10th percentiles of price index distribution since 1981. ^a The *real growth rate of per capita GDPi* in the estimation is trimmed to below the 99th and above the 1st percentiles of the sample distribution given large outliers. ^b 2-stage-System GMM estimations use a collapsed instrument matrix and perform the Windmeijer (2005) correction of the covariance matrix. The constant and other variables are omitted in some of the 2-system GMM estimations owing to their collinearity with the fixed effects. ^c New variable tested assumed as an exogenous instrument. ^d The null hypothesis for the Hansen J-test is that the full set of instruments is valid. SSA = sub-Saharan Africa; LICs = low income countries. EMDEs = emerging markets and developing economies.

For that, we use the Oxford index of strictness of COVID-19 preventive measures retrieved from *ourworldindata.org* (see, Hale and others, 2021). The monthly index is again aggregated by year, 2020 and 2021, replacing the number of COVID-19 *cases per million people* in Equation (3). Table 5 displays the regression results. The stringency of COVID-19 preventive measures is not statistically significantly associated with private savings in SSA and in any other country group analyzed. The coefficient for that variable reported in a row highlighted in bold on Table 5 is not significant in the regressions using 2-Stage System GMM. As it will be shown later on the paper, such lack of statistical significance of the stringency of preventive measures remains if we add to the specification the number of COVID-19 cases or deaths (per million people) as additional control variables in the estimations. Table 5 suggests, therefore, that at least for our sample of countries, including for SSA, the stringency of COVID-19 preventive measures (in an annual basis) does not capture statistically the effects of foregone consumption or forced savings on private savings.

Table 5. Private Savings and COVID-19 Stringency of Measures, 2017–21

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
	SSA economies		LICs ^a		EMDEs (excluding SSA) ^a	
	OLS FE	2-st. Sys-GMM ^b	OLS FE	2-st. Sys-GMM ^b	OLS FE	2-st. Sys-GMM ^b
Constant	4.944 (0.051)	-816.910 (-0.866)	90.155 (1.091)	-40.680 (-0.337)	-30.653 (-0.402)	-33.305 (-0.244)
Covid-19 Stringency Measures^c	-0.021 (-0.539)	0.150 (0.321)	0.011 (0.284)	-0.085 (-0.442)	0.128* (1.929)	0.032 (0.243)
Ln real per capita GDPi (PPP)	0.009 (0.116)	0.685 (1.211)	-0.076 (-0.977)	0.134 (0.493)	-0.025 (-0.410)	0.056 (0.330)
Real growth rate of per capita GDPi (PPP)	0.747*** (3.911)	0.186 (0.237)	0.496*** (3.320)	0.543*** (3.481)	0.299** (2.568)	0.276*** (3.222)
Ln terms of trade	-0.000 (-0.004)	0.143 (0.711)	-0.025 (-0.447)	0.028 (0.214)	0.172** (2.041)	-0.007 (-0.089)
Inflation	0.718** (2.363)	-0.929 (-0.584)	0.507* (1.824)	0.143 (0.295)	0.245 (1.656)	0.010 (0.020)
Flow of private sector credit/GPDI	-0.571*** (-3.292)	-0.776 (-0.937)	-0.335** (-2.293)	-0.362 (-0.987)	-0.030 (-0.296)	0.010 (0.038)
Share of urban population	-0.308 (-0.202)	7.823 (0.551)	-0.695 (-0.452)	-1.850 (-0.270)	-0.532 (-0.865)	-0.191 (-0.263)
Public saving/GPDI	-0.015 (-0.053)	-0.803 (-0.649)	-0.329* (-1.907)	-0.187 (-0.391)	-0.121 (-0.563)	-0.199* (-1.788)
R-squared	0.47		0.41		0.23	
Adj R-squared	0.20		0.03		0.02	
F test value		6.38		5.35		63.69
F-test p-value		0.000		0.000		0.000
Arellano-Bond test for AR(1) in first differences (p-value)		0.043		0.008		0.009
Arellano-Bond test for AR(2) in first differences (p-value)		0.802		0.194		0.231
Hansen J-test or instrument validity (p-value) ^d		1.000		1.000		1.000
Sargan test of overidentifying restrictions (p-value)		0.424		0.551		0.947
Observations	77	77	103	103	145	145
Minimum observations per country	1	1	1	1	1	1
Number of Countries	20	20	26	26	36	36

Sources: WEO database; WDI database; Grigoli et al. (2018); Gruss et al. (2020); Hale et al. (2021); ourworldindata.org; and authors' estimations.

Notes: All estimations include country- and time-fixed effects with t-statistics (reported in parentheses) estimated using robust standard errors.

Significance at *** p<0.01; ** p < 0.05; * p < 0.10. Countries below one million people in 2020 are excluded from the sample. The data sample also excludes country-year data points above the 90th and below the 10th percentiles of price index distribution since 1981. ^a The *real growth rate of per capita GDPi* in the estimation is trimmed to below the 99th and above the 1st percentiles of the sample distribution given large outliers.

^b 2-stage-System GMM estimations use a collapsed instrument matrix and perform the Windmeijer (2005) correction of the covariance matrix.

The constant and other variables are omitted in some of the 2-system GMM estimations owing to their collinearity with the fixed effects.

^c New variable tested assumed as an exogenous instrument. ^d The null hypothesis for the Hansen J-test is that the full set of instruments is valid.

SSA = sub-Saharan Africa. LICs = low income countries. EMDEs = emerging markets and developing economies.

COVID-19 Vaccination

The vaccination rate against COVID-19 could be another potential factor affecting private savings since the vaccines development in the second semester of 2020. The specialized literature indicates that COVID-19 vaccination has helped to reduce the severity of cases and decrease its mortality (Agrawal and others, 2021). It has also led to the relaxation of COVID-19 preventive measures in many countries. All those factors could, in principle, motivate households to reduce potential precautionary savings if there is the expectation of a lower duration of the pandemics. *Foregone consumption* or *forced savings* may also decline given the lifting or relaxation of some of the preventive measures.

This section tests those hypotheses. It checks whether the replacement of COVID-19 *cases per million people* by the *total number of vaccine shots in one country as a percentage of its population* in Equation (3) provides a coefficient ω that it is statistically significant and negative. We use the total number of vaccine shots because in

some countries there was a distribution of booster shots already in 2021. And the larger the number of vaccine shots, the more protected one person is from severe manifestations of COVID-19.

Hence, a statistically significant and negative coefficient for that variable would indicate an adverse association of COVID-19 vaccination with private savings. For that, the *number of Covid-19 vaccination shots* (independently of their producer) are also retrieved online from *ourworldindata.org* (see, Mathieu et al., 2021). Vaccination shots data are then aggregated by year, 2020 and 2021. The aggregated *number of vaccination shots* is divided by each country's population (and transformed in percentages) in each of those two years.

The results, displayed in Table 6, are again not statistically significant when the 2-Stage System GMM estimator is employed for any of the samples investigated. For SSA economies, specifically, the low vaccination rates may not yet allow to capture their economic effects econometrically. SSA has the slowest vaccine rollout in the world with a very low share of its population vaccinated (IMF, 2021a; and Hakobyan, 2021). By the end of 2021, in our country sample, the number of vaccine shots represented on average only about 5 percent of each countries' population in SSA (see also Hakobyan, 2021). One of the main reasons for those low numbers is the lack of vaccines supply in SSA (IMF, 2021a). Vaccine hesitancy in the region is also sizeable. But, even if the region had already obtained enough vaccines, its poor trade and logistics quality could be another hurdle to overcome (Nyantakyi and Munemo, 2021). These latter authors show that SSA economies with poor quality of logistics generally have lower vaccination rates, which could be mitigated, for example, by an increase of digitalization in the rollout of those vaccines.

Combining Different COVID-19-Related Variables

This final sub-section tests for combinations of different COVID-19 variables to check whether they reinforce each other, reducing potential (omitted variable) biases in the estimations. Table 7 presents the estimation results only for the relevant coefficients in question, i.e., those related to COVID-19 variables. So, we test whether the combinations of COVID-19 *cases* or *deaths* with the *stringency of preventive measures* or *vaccine shots* lead to statistically significant coefficients. We further check whether the combination of the *stringency of preventive measures* and *vaccination rates* are also relevant. All those tests are done for the three country samples of our data (SSA, LICs, and EMDEs excluding SSA).

The combination of COVID-19 variables improves their statistical significance in some of the samples. For the 2-Stage System GMM estimations, *COVID-19 cases per million people* is statistically significant and negative for LICs when combined with the *vaccination rate of COVID-19*. At the same time, for that country group (and combination with *COVID-19 cases per million people*) the *number of vaccination shots divided by the country's total population* is statistically significant and positive. This suggests that for LICs, more vaccination shots may have led to higher savings rates. However, that same coefficient in Table 7 is statistically significant and negative for EMDEs (excluding SSA countries) suggesting the opposite effect for that country group.ⁱ

The four analyses of this section highlight some of the impacts of COVID-19 on private savings in SSA and other economies. The fact that during COVID-19 private savings went down after controlling for different macro and COVID-related variables in the region is in contrast with more developed economies where savings are estimated to have gone significantly up (IMF 2021b and McGregor, Suphaphiphat, and Toscani, 2022). Given the large financing needs in SSA to boost its economic recovery from COVID-19 and towards reaching the Sustainable Development Goals, those results highlight the importance of continue moving forward or even accelerating the pandemic response, particularly vaccination, in the continent. This is further important to reduce some of the long-term risks of COVID-19, including in the region (Agarwal and others, 2022).

Table 6. Private Savings and COVID-19 Vaccine Shots, 2017–2021

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
	SSA economies		LICs ^a		EMDEs (excluding SSA) ^a	
	OLS FE	2-st. Sys-GMM ^b	OLS FE	2-st. Sys-GMM ^b	OLS FE	2-st. Sys-GMM ^b
Constant	11.198 (0.108)	59.669 (0.067)	91.981 (1.016)	-4.968 (-0.037)	-7.127 (-0.107)	-44.516** (-2.537)
Total Covid-19 vaccine shots (percent of population)^c	0.122* (1.780)	0.168 (0.364)	0.031 (0.382)	0.038 (0.388)	-0.015 (-0.319)	-0.129 (-1.209)
Ln real per capita GDPi (PPP)	0.007 (0.089)	0.018 (0.023)	-0.095 (-1.206)	-0.028 (-0.251)	-0.047 (-0.760)	0.125 (1.588)
Real growth rate of per capita GDPi (PPP)	0.747*** (6.154)	0.837* (1.743)	0.573*** (4.730)	0.578*** (4.777)	0.287** (2.300)	0.241** (2.600)
Ln terms of trade	0.010 (0.192)	0.143 (0.876)	-0.022 (-0.411)	-0.117 (-0.993)	0.142* (1.761)	0.033 (0.725)
Inflation	0.683*** (3.056)	0.800 (0.643)	0.544** (2.208)	0.634* (1.902)	0.239 (1.378)	-0.316 (-0.685)
Flow of private sector credit/GPDI	-0.696*** (-3.620)	-1.130 (-1.711)	-0.357** (-2.069)	-0.364 (-1.268)	-0.078 (-0.850)	-0.172 (-0.736)
Share of urban population	-0.586 (-0.402)	-4.109 (-0.375)	-0.430 (-0.271)	2.369 (0.979)	-0.374 (-0.591)	-1.359 (-0.758)
Public saving/GPDI	-0.135 (-0.706)	0.431 (0.502)	-0.319* (-1.880)	-0.610*** (-2.984)	-0.117 (-0.555)	-0.160 (-1.651)
R-squared	0.59		0.50		0.20	
Adj R-squared	0.15		0.06		0.01	
F test value		11.21		7.881		43.24
F-test p-value		0.000		0.000		0.000
Arellano-Bond test for AR(1) in first differences (p-value)		0.071		0.010		0.014
Arellano-Bond test for AR(2) in first differences (p-value)		0.992		0.275		0.329
Hansen J-test or instrument validity (p-value) ^d		1.000		1.000		1.000
Sargan test of overidentifying restrictions (p-value)		0.432		0.011		0.826
Observations	79	79	105	105	147	147
Minimum observations per country	1	1	1	1	1	1
Number of Countries	20	20	26	26	36	36

Sources: WEO database; WDI database; Grigoli et al. (2018); Gruss et al. (2020); Ritchie et al. (2020); ourworldindata.org; and authors' estimations.

Notes: All estimations include country- and time-fixed effects with t-statistics (reported in parentheses) estimated using robust standard errors.

Significance at *** p<0.01; ** p<0.05; * p<0.10. Countries below one million people in 2020 are excluded from the sample. The data sample also exclude country-year data points above the 90th and below the 10th percentiles of price index distribution since 1981. ^a The *real growth rate* of per capita GDPi in the estimation is trimmed to below the 99th and above the 1st percentiles of the sample distribution given large outliers.

^b 2-stage-System GMM estimations use a collapsed instrument matrix and perform the Windmeijer (2005) correction of the covariance matrix.

The constant and other variables are omitted in some of the 2-system GMM estimations owing to their collinearity with the fixed effects.

^c New variable tested assumed as an exogenous instrument. ^d The null hypothesis for the Hansen J-test is that the full set of instruments is valid.

SSA = sub-Saharan Africa. LICs = low income countries. EMDEs = emerging markets and developing economies.

Robustness Checks and Additional Tests

This section performs robustness checks to the previous estimations performed. We test the robustness of the results of both analyses on the historical savings determinants and on the COVID-19 impact on savings. Given the focus of the paper, we only perform those tests for the sample of SSA economies.

One challenge in performing such robustness checks, however, is the lack of alternative data availability for SSA economies. For other economies, particularly in AEs, high-frequency and alternative data is available on savings (IMF, 2021b). We overcome those challenges by looking at simple saving proxies with a different denominator for the dependent variable (using GDP instead of GPDI) as well as using monetary authorities and financial markets' data on bank deposits to investigate variations of the specifications of Equations (1) to (4).

Table 7. Coefficients of Private Savings Estimations with Combined COVID-19 Variables, 2017–2021

Regression	Sample	COVID-19 cases per million inhabitants		COVID-19 Deaths per million inhabitants		COVID-19 stringency measures		COVID-19 vaccine shots (percent of population)	
		OLS FE	2-st. Sys-GMM ^a	OLS FE	2-st. Sys-GMM ^a	OLS FE	2-st. Sys-GMM ^a	OLS FE	2-st. Sys-GMM ^a
<i>Stringency and Covid-19 cases^b</i>	SSA	-0.000** (-2.503)	-0.000 (-0.154)			-0.002 (-0.039)	-0.082 (-0.050)		
	LICS	-0.000 (-1.360)	-0.000 (-1.017)			0.117 (1.590)	0.010 (0.077)		
	EMDEs (exc. SSA)	-0.000 (-1.360)	-0.000 (-1.017)			0.117 (1.590)	0.010 (0.077)		
	SSA			-0.010*** (-3.902)	-0.022 (-0.906)	-0.004 (-0.104)	0.066 (0.083)		
	LICS			-0.005 (-0.700)	-0.011 (-0.398)	0.020 (0.464)	-0.074 (-0.316)		
	EMDEs (exc. SSA)			-0.000 (-1.426)	0.000 (0.124)	0.130* (1.985)	0.069 (0.558)		
<i>Vaccine shots and Covid-19 cases^b</i>	SSA	-0.000*** (-5.770)	-0.000 (-1.689)					0.238*** (4.206)	0.319 (1.173)
	LICS	-0.000*** (-4.914)	-0.000** (-2.774)					0.207*** (3.270)	0.324** (2.100)
	EMDEs (exc. SSA)	-0.000* (-1.962)	-0.000 (-1.121)					0.008 (0.167)	-0.175* (-1.786)
	SSA			-0.013*** (-6.448)	-0.021 (-1.669)			0.200*** (3.879)	0.237 (0.847)
<i>Vaccine shots and Covid-19 deaths^b</i>	LICS			-0.010 (-0.987)	-0.004 (-0.335)			0.076 (0.808)	0.102 (0.640)
	EMDEs (exc. SSA)			-0.000 (-0.951)	-0.000 (-0.150)			-0.013 (-0.282)	-0.103 (-0.955)
	SSA					-0.058 (-1.158)	0.064 (0.138)	0.156* (1.802)	0.221 (0.395)
	LICS					-0.002 (-0.034)	-0.103 (-0.529)	0.034 (0.343)	-0.000 (-0.000)
<i>Vaccine shots and Covid-19 stringency^b</i>	EMDEs (exc. SSA)					0.180** (2.475)	0.102 (0.850)	-0.083* (-1.837)	-0.077 (-0.853)

Sources: WEO database; WDI database; Grigoli et al. (2018); Gruss et al. (2020); Hale et al. (2021); Mathieu et al. (2021); Ritchie et al. (2020); ourworldindata.org; and authors' estimations.

Notes: All estimations include country fixed-effects. t-statistics in parentheses, estimated with robust standard errors. The regressions use all variables of the baseline specification, but the table just report the estimated coefficients of the variables of interest. Significance at *** p<0.01;

** p < 0.05; * p < 0.10. All = all countries in sample; SSA = sub-saharan african economies; LICs = low-income countries; EMDEs = emerging and developing economies; AE = advanced economies. Countries below one million people in 2020 are excluded from the sample. The data sample excludes country-year data points above the 90th and below the 10th percentiles of price index distribution since 1981. The *real growth rate* of per capita GDP in the estimation is also trimmed to below the 99th and above the 1st percentiles of the sample distribution given large outliers.

^a 2-stage-System GMM estimations use a collapsed instrument matrix and perform the Windmeijer (2005) correction of the covariance matrix.

^b Both tested variables are assumed to be an exogenous instrument.

Private Savings as Ratio to GDP

This sub-section changes the denominator of our dependent variable and investigates the determinants of private savings and the effects of COVID-19 on the ratio of private savings to *GDP* instead of the *GPDI*. A second relatedly test changes only the denominator of dependent variable to *GDP* while the explanatory variables remain with ratios to *GPDI*. The main objective is to verify whether our previous results are indeed caused by variations on the numerator (private savings) instead of on the denominator (*GPDI*).

For that, we rerun the baseline specifications presented in Equations (1), and (3) and (4) (for the analyses investigating the impact of COVID-19) with those two types of tests. Table 8 reports the results. There, we

present the estimations of each of those equations using the SSA sample of economies only. For the estimations in which variables' denominators are changed to GDP, the results are reported using both estimators, the OLS-FE and the 2-Stage System GMM estimators. In turn, for the estimations replacing the denominator solely for the dependent variable (*private savings rate*), only the 2-Stage System GMM estimation results are reported. The tests for the overall estimations in all columns convey that most of the regressions in Table 8 are statistically significant and with valid instruments.

The estimations confirm the statistical significance and positive coefficient of *real per capita economic growth* (now measured by GDP growth) in the baseline specification (Column 2 of Table 8). Beyond that, with *private savings over GDP* as dependent variable, the coefficients for *inflation rate* and the *share of urban population* are also statistically significant and positive when the 2-Stage System GMM estimator is applied.

The statistically significant and positive coefficient for *share of urban population* suggests higher savings in more urbanized countries and is consistent with some of the estimations in Tables 2a and 2b. For the robustness check of the baseline estimation using only the dependent variable as a percentage of GDP, the only significant variable is *flow of private sector creditor as percentage of GDP*. Its negative coefficient indicates that a higher private sector creditor may be associated with lower private savings rate.

The estimations trying to understand the impact of COVID-19 confirm that the effects of pandemic are statistically significant and negatively associated with the ratio of *private savings to GDP*. In Column 5 (using only the dependent variable as percent of GDP), the *number of COVID-19 cases per million inhabitants* has a statistically significant and negative coefficient. The *number of COVID-19 deaths per million inhabitants* is again statistically significant and negative when only the dependent variable is calculated as percent of GDP (Column 9). This suggests the robustness of the result for that COVID-19 variable, which had been obtained also in the baseline estimation of Equation (4) (see Table 4).

Regarding the other two COVID-19 variables (i.e., the *stringency of COVID-19 preventive measures* and the *number of vaccination shots as percentage of a SSA country's population*) they both remain non-statistically significant on the robustness checks performed in Table 8. Columns 10 to 15 of Table 8 report those regression outcomes.

In sum, the results of these first tests indicate the robustness of our main findings in the paper when the dependent variable, *private savings rates*, is measured in *percent of GDP* instead of in *percent of GDP*. The next subsection uses another dependent variable attempting to capture private savings in a different way for SSA economies.

Table 8. Robustness Check with Private Savings as a Ratio to GDP for Sub-Saharan African Economies

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
	Baseline Specification			COVID-19 Cases per Population ¹			COVID-19 Deaths per Population ²			COVID-19 Stringency of Measures ³			COVID-19 Vaccination ⁴		
	OLS FE	2-st. Sys-GMM ⁵	2-st. Sys-GMM ⁶	OLS FE	2-st. Sys-GMM ⁵	2-st. Sys-GMM ⁶	OLS FE	2-st. Sys-GMM ⁵	2-st. Sys-GMM ⁶	OLS FE	2-st. Sys-GMM ⁵	2-st. Sys-GMM ⁶	OLS FE	2-st. Sys-GMM ⁵	2-st. Sys-GMM ⁶
Constant	-30.619 (-1.640)			-260.484 (-1.359)	-244.365 (-1.376)	2.876 (0.015)	-256.123 (-1.320)	-482.927 (-1.020)	-142.970 (-0.617)	-284.851 (-1.344)	-9.534 (-0.011)	-449.912 (-0.436)	-386.543* (-1.964)	-641.268 (-1.205)	489.593 (0.588)
Lag dependent variable	0.543*** (13.623)	0.025 (0.059)	-0.373 (-0.660)												
Ln real per capita GDP (PPP)	0.017** (2.162)	-0.062 (-1.131)		0.097 (1.124)	0.126 (1.510)		0.093 (1.056)	0.105 (0.338)	0.191 (0.561)	0.119 (1.411)	-0.036 (-0.099)		0.155** (2.140)	0.345 (1.022)	
Ln real per capita GDP (PPP)			-0.009 (-0.335)			-0.009 (-0.034)						0.450 (0.654)			-0.365 (-0.441)
Real growth rate of per capita GDP (PPP)	0.098** (2.211)	2.501* (1.954)		0.493** (2.604)	1.024 (1.309)		0.506** (2.727)	0.853 (1.709)		0.437 (1.515)	0.449 (0.478)		0.441** (2.309)	1.110 (1.634)	
Real growth rate of per capita GDP (PPP)			0.049 (0.603)			0.849*** (4.099)			0.754*** (3.877)			0.306 (0.470)			0.857 (1.598)
Ln terms of trade	0.008 (1.023)	0.229 (1.000)	0.047 (0.929)	-0.030 (-0.576)	-0.003 (-0.009)	-0.067 (-0.332)	-0.029 (-0.576)	0.522 (0.848)	0.053 (0.301)	-0.037 (-0.706)	-0.084 (-0.354)	-0.038 (-0.171)	-0.036 (-0.869)	-0.042 (-0.187)	0.090 (0.350)
Inflation	0.053 (1.385)	2.099* (1.718)	-0.055 (-0.327)	0.512 (1.356)	0.714 (0.818)	-0.120 (-0.160)	0.528 (1.437)	0.924 (0.867)	-0.245 (-0.281)	0.458 (0.976)	1.166 (1.299)	-0.532 (-0.372)	0.555 (1.518)	0.212 (0.150)	1.078 (0.920)
Flow of private sector credit/GDP	-0.038 (-0.799)	0.457 (0.432)		-0.243 (-0.742)	0.997 (0.723)		-0.254 (-0.759)	0.278 (0.287)		-0.172 (-0.642)	1.932 (0.797)		-0.285 (-0.870)	-1.155 (-0.566)	
Flow of private sector credit/GDP			-2.326* (-1.733)			-1.870 (-1.693)			-2.030 (-1.716)			-0.443 (-0.995)			-0.808 (-1.040)
Share of urban population	-0.141* (-1.809)	0.888** (2.312)	0.216 (0.737)	1.996 (1.462)	-0.573 (-0.967)		2.137 (1.512)	0.084 (0.047)	-0.284 (-0.138)	1.529 (1.087)	3.433 (0.493)	4.588 (0.336)	2.263 (1.080)	-1.432 (-0.899)	-8.077 (-0.977)
Public saving/GDP	-0.458*** (-7.867)	-0.853 (-0.899)		-0.811** (-2.148)	1.490 (0.868)		-0.808** (-2.177)	-0.072 (-0.051)		-0.766* (-1.985)	-0.069 (-0.044)		-0.988*** (-3.165)	-1.854 (-0.912)	
Public saving/GDP			-0.104 (-0.290)			-0.433 (-0.546)			-0.390 (-0.504)			-0.505 (-0.523)			0.160 (0.145)
Covid-19 cases per million inhabitants				-0.000* (-1.894)	0.000 (0.584)										
Covid-19 deaths per million inhabitants							-0.007** (-2.566)	0.002 (0.263)	-0.019* (-1.933)						
Covid-19 stringency of preventive measures										-0.047 (-1.097)	-0.127 (-0.682)	-0.067 (-0.161)			
Covid-19 first dose of vaccines (as percentage of population)													0.173* (1.950)	0.630 (1.415)	0.344 (0.810)
R-squared	0.63			0.30			0.30			0.16			0.32		
Adj R-squared	0.72			0.00			0.00			0.00			0.00		
F test value		38.7	2,832.0		3.4	18.2		64.9	6.2		0.8	2.3		19.0	14.5
F-test p-value		0.000	0.000		0.008	0.000		0.000	0.000		0.676	0.055		0.000	0.000
Arellano-Bond test for AR(1) in first differences (p-value)		0.041	0.064		0.039	0.039		0.648	0.054		0.192	0.239		0.203	0.396
Arellano-Bond test for AR(2) in first differences (p-value)		0.113	0.075		0.820	0.420		0.190	0.808		0.973	0.570		0.105	0.781
Hansen J-test or instrument validity (p-value) ⁷		1.000	1.000		1.000	1.000		1.000	1.000		1.000	1.000		1.000	1.000
Sargan test of overidentifying restrictions (p-value)		0.000	0.264		0.553	0.340		0.574	0.342		0.478	0.360		0.516	0.360
Observations	939	939	986	82	82	79	82	82	79	81	81	78	82	82	79
Minimum observations per country	4	4	11	1	1	1	1	1	1	1	1	1	1	1	1
Number of Countries	31	31	31	21	21	20	21	21	20	21	21	20	21	21	20
Period sample	1983-2021	1983-2021	1983-2021	2017-2021	2017-2021	2017-2021	2017-2021	2017-2021	2017-2021	2017-2021	2017-2021	2017-2021	2017-2021	2017-2021	2017-2021

Sources: International Financial Statistics (IFS) database; WEO database; WDI database; Grigoli et al. (2018); Gruss et al. (2020); Mathieu et al. (2021); Ritchie et al. (2020); ourworldindata.org; and authors' estimations.

Notes: All estimations include country- and time-fixed effects with t-statistics (reported in parentheses) estimated using robust standard errors. Significance at *** p<0.01; ** p<0.05; * p<0.10.

¹ Estimations performed in first-differences and with the same outlier treatment of the estimations being checked for robustness. ² Two-stage System GMM estimations use a collapsed instrument matrix and perform the Windmeijer (2005) correction of the covariance matrix. For most of its regressions, the constant is excluded from the estimation owing to its collinearity with the fixed effects. ³ The null hypothesis for the Hansen J-test is that the full set of instruments is valid.

Bank Deposits

Our second robustness check uses *bank deposits* (as a share of the total monetary base) as a proxy for the private savings rate in SSA to test how the results compare with our baseline measure of private savings rate in the paper measured as percent of GDP. Such alternative measure of private savings rate is consistent with other studies that attempt to understand private savings dynamics in SSA by zooming in banking deposits (e.g., WSBI and MasterCard Foundation, 2020).

In order to perform such robustness check, three monetary variables coming from central bank surveys and published in the IMF's International Financial Statistics (IFS) database are used. These are: (i) the *monetary base* (in domestic currency); (ii) the *liabilities to other depository corporations* (in domestic currency), which is the proxy for bank deposits used in this robustness checks; and (iii) the *currency in circulation*, which is also equal to the difference between the monetary base and the *liabilities to other depository corporations*. All those variables are denominated in local currency. Deposits are taken as a ratio to the full monetary base. We test the robustness for Equations (1) to (4). For example, Equations (3) and (4) are rewritten as:

$$\Delta deposits_{i,t} = \pi \Delta deposits_{i,t-1} + \varphi X_{i,t} + \delta Z_{i,t} + \omega covid_cases_{i,t} + \alpha_i + \tau_t + \varepsilon_{i,t}, \quad (5)$$

or

$$\Delta deposits_{i,t} = \pi \Delta deposits_{i,t-1} + \varphi X_{i,t} + \delta Z_{i,t} + \omega covid_deaths_{i,t} + \alpha_i + \tau_t + \varepsilon_{i,t}, \quad (6)$$

where $deposits_{i,t}$ corresponds to the ratio between the *liabilities to other depository corporations* and the *monetary base*, with both variables coming from each country's central bank annual survey. All other variables are the same as in the previous sections.

The intuition for adopting this proxy to private savings is that SSA agents could prefer to use bank deposits as a savings instrument, while keeping in cash the share of income that they want to consume. Such saving device (bank deposits) may be more relevant in LICs (like most of SSAs) where financial markets are not well developed, and where a large share of individuals is in the informal sector or are hand-to-mouth consumers.

Another reason to select this alternative dependent variable is that we are able to obtain it for the year 2020 (already under COVID-19). Most of the other financial variables that could be used as a proxy for private savings are not yet available for such a recent period for SSA economies. Still, one caveat of the analysis is that data for the proxy of bank deposits are only available from 2000 onwards. So, in order to check the robustness of the results for the historical saving rates determinants (Table 1), we rerun the baseline regressions also starting from 2000s instead of 1983 as in our baseline estimations. The country samples also change in this robustness checks (see Table B in Annex I).

Table 9 shows the estimation results. For each test, we report four columns applying the new data sample: two columns for our baseline indicator of private savings rate, using our two estimators (OLS-FE and 2-Stage System GMM); and two other columns applying the same estimators to the new savings proxy (i.e., *bank deposits over the monetary base*). The first four columns investigate the historical determinants of savings, while the remainder of columns add the COVID-19 variables and analyze how they impact this new proxy of private savings.

Table 9. Robustness Check with Bank Deposits as a Ratio of Money Base for Sub-Saharan African Economies

VARIABLES	(1)		(2)		(3)		(4)		(5)		(6)		(7)		(8)		(9)		(10)		(11)		(12)	
	Savings over GDPD ^a				Deposits over Money Base ^a				Savings over GDPD ^b				Deposits over Money Base ^b				Savings over GDPD ^b				Deposits over Money Base ^b			
	OLS FE	2-st. Sys-GMM ^c	OLS FE	2-st. Sys-GMM ^c	OLS FE	2-st. Sys-GMM ^c	OLS FE	2-st. Sys-GMM ^c	OLS FE	2-st. Sys-GMM ^c	OLS FE	2-st. Sys-GMM ^c	OLS FE	2-st. Sys-GMM ^c	OLS FE	2-st. Sys-GMM ^c	OLS FE	2-st. Sys-GMM ^c	OLS FE	2-st. Sys-GMM ^c	OLS FE	2-st. Sys-GMM ^c	OLS FE	2-st. Sys-GMM ^c
Constant	-12.343 (-0.476)	367.724 (1.154)	7.319 (0.574)	-32.400 (-0.069)	-13.545 (-0.077)	-10.259 (-0.062)	-174.787 (-0.709)	-6.741 (-0.033)	-9.910 (-0.055)	-607.078 (-1.449)	-172.185 (-0.697)	256.245 (0.255)												
Lag dependent variable	0.440*** (7.416)	0.077 (0.312)	0.704*** (9.404)	0.469 (0.462)																				
Ln real per capita GDPD (PPP)	0.046** (2.144)	-0.781 (-1.025)	-0.009 (-1.189)	-0.090 (-0.188)	0.017 (0.106)	-0.070 (-0.252)	0.190 (0.840)	0.033 (0.078)	0.012 (0.074)	0.350 (1.041)	0.185 (0.804)	-0.094 (-0.173)												
Real growth rate of per capita GDPD (PPP)	0.065 (1.083)	-0.035 (-0.679)	-0.011 (-1.055)	-0.147 (-0.480)	0.778*** (5.988)	0.769*** (3.275)	0.018 (0.086)	0.224 (0.774)	0.773*** (5.888)	0.634*** (3.013)	0.015 (0.074)	0.270 (0.859)												
Ln terms of trade	0.019 (0.911)	0.625 (1.447)	0.008 (0.957)	-0.187 (-1.270)	0.045 (0.614)	0.069 (0.309)	-0.075 (-0.691)	-0.034 (-0.239)	0.043 (0.606)	-0.025 (-0.131)	-0.076 (-0.684)	0.022 (0.146)												
Inflation	-0.002 (-0.025)	-1.998 (-1.568)	0.057 (0.805)	-0.592 (-0.438)	0.699 (1.684)	0.289 (0.677)	0.345 (0.415)	0.481 (0.498)	0.692 (1.712)	-0.295 (-1.698)	0.332 (0.383)	0.820 (0.540)												
Flow of private sector credit/GDPD	-0.047 (-0.345)	-0.265 (-0.212)	-0.158 (-1.122)	0.071 (0.125)	-0.785* (-1.949)	-1.314 (-1.521)	-0.847 (-1.289)	-0.539 (-0.602)	-0.795* (-2.065)	-1.991*** (-3.138)	-0.864 (-1.229)	-0.565 (-1.005)												
Share of urban population	-0.557 (-1.472)	-2.637 (-0.857)	0.155 (0.525)	5.723 (1.194)	-0.564 (-0.218)	0.696 (0.325)	2.169 (0.500)	-0.221 (-0.056)	-0.538 (-0.213)	10.709 (1.586)	2.195 (0.510)	-5.899 (-0.296)												
Public saving/GDPD	-0.406*** (-6.617)	-1.778** (-2.603)	0.076** (2.081)	0.396 (0.405)	-0.108 (-0.350)	0.015 (0.015)	-0.054 (-0.079)	1.194 (0.532)	-0.140 (-0.438)	0.094 (0.105)	-0.072 (-0.109)	0.592 (0.720)												
Covid-19 cases per million inhabitants					0.000 (0.647)	-0.000 (-0.057)	0.000 (0.268)	0.000 (0.283)																
Covid-19 deaths per million inhabitants									0.052 (0.618)	-0.157 (-1.167)	0.015 (0.156)	0.149 (0.487)												
R-squared	0.56		0.61		0.68		0.29		0.68		0.29													
Adj R-squared	0.24		0.88		0.23		0.00		0.23		0.00													
F test value		1.4		53.5		0.4		3.9		7.5		2.5												
F-test p-value		0.183		0.000		0.917		0.005		0.000		0.036												
Arellano-Bond test for AR(1) in first differences (p-value)		0.001		0.331		0.061		0.069		0.416		0.050												
Arellano-Bond test for AR(2) in first differences (p-value)		0.688		0.791		0.756		0.294		0.668		0.230												
Hansen J-test or instrument validity (p-value) ^d		1.000		1.000		1.000		1.000		1.000		1.000												
Sargan test of overidentifying restrictions (p-value)		0.000		0.131		0.138		0.242		0.154		0.242												
Observations	551	551	491	491	66	66	66	66	66	66	66	66												
Minimum observations per country	5	5	7	7	1	1	1	1	1	1	1	1												
Number of Countries	31	31	28	28	20	20	20	20	20	20	20	20												
Period sample	2000-2020	2000-2020	2000-2020	2000-2020	2017-2020	2017-2020	2017-2020	2017-2020	2017-2020	2017-2020	2017-2020	2017-2020												

Sources: International Financial Statistics (IFS) database; WEO database; WDI database; Grigoli et al. (2018); Gruss et al. (2020); Mathieu et al. (2021); Ritchie et al. (2020); ourworldindata.org; and authors' estimations.

Notes: All estimations include country- and time-fixed effects with t-statistics (reported in parentheses) estimated using robust standard errors. Significance at *** p<0.01; ** p<0.05; * p<0.10. Countries below one million people in 2020 are excluded from 1

^a Estimations performed excluding outliers in the same way of the baseline specifications. ^b Estimations performed with variables in first-differences and excluding country-year data points above the 95th and below the 5th percentiles of the price index distribution since 1965. ^c 2 stage-System GMM estimations use a collapsed instrument matrix and perform the Windmeijer (2005) correction of the covariance matrix.

^d The null hypothesis for the Hansen J-test is that the full set of instruments is valid.

SSA = sub-Saharan Africa. LICs = low income countries. EMDEs = emerging markets and developing economies.

The robustness checks in Table 9 with the alternative dependent variable and data sample, although displaying in most of the estimations similar coefficients' signs to the previous estimations, lead to inconclusive results. That is because practically no variable is statistically significant in the regressions using the 2-Stage System GMM when the alternative dependent variable (*bank deposits over the monetary base*) is employed. The COVID-19 variables are also not statistically significant in any of the estimations.

Conclusions

This paper addresses two main research questions, which constitute its contributions to the literature. First, it revisits the main determinants of private savings in the SSA region and compare them with other country groups. Second, to our knowledge, this is the first paper to investigate the impact of COVID-19 on private savings in SSA.

The paper performs four types of analyses to accomplish its two objectives. First, it describes and analyzes historical *macro* trends and stylized facts on SSA's savings across its different sub-regions and country groups in the last four decades, including a description of the recent effects of COVID-19 on private savings at *macro level* in 2020 and 2021. Second, the paper presents some stylized facts of the impact of COVID-19 on household savings at *micro level* using household surveys prepared by the United Nations Development Program (UNDP, 2020) in the second and third quarters of 2020 in selected SSA economies. Third, the paper estimates empirically the determinants of private savings in the last four decades in SSA and compares those determinants with the rest of the world and other world regions. Fourth, the effects of COVID-19 (cases and deaths) on the change in saving rates in SSA are investigated econometrically, controlling for some of the other main determinants of savings. That analysis also zooms in on the stringency of COVID-19 preventive measures and on COVID-19 vaccination.

Regarding the historical determinants of private saving rates, we follow Grigoli, Herman, and Schmidt-Hebbel's (2018) theoretical discussion and econometric specification. The paper further performs additional tests on this specification, including by checking whether *labor informality*, among other variables, impacts on private saving rates as found by some recent literature (Schclarek and Caggia, 2015; and Dobson et al., 2020).

The econometric analyses, using four decades of panel data for the SSA region up to 2021, reaffirms the results of Elbadawi and Mwega (2000) and Shawa (2016) on the importance of *real per capita economic growth* for the region. As Figure 7 displays for every 1 percentage point increase in real per capita GDP growth—a value that is around the median of real per capita GDP growth between 2020 and 2021 in our SSA country sample—is, on average, associated with an increase in approximately 0.45 percentage points of GDP in the SSA countries' private savings rate. If one uses an increase of 2 percentage points (which is around the sample average of real per capita GDP growth between 2020 and 2021 in SSA), *ceteris paribus*, private savings rate in SSA would be expected to increase by 0.9 percentage points of GDP.

One main policy implication of this finding is that SSA countries should continue adopting policies and structural reforms to accelerate real per capital economic growth in the region. Building institutions that would spur spillover effects from external demand or mitigate effects of negative external shocks are also key (Gruss, Nabar, and Poplawski-Ribeiro, 2020).

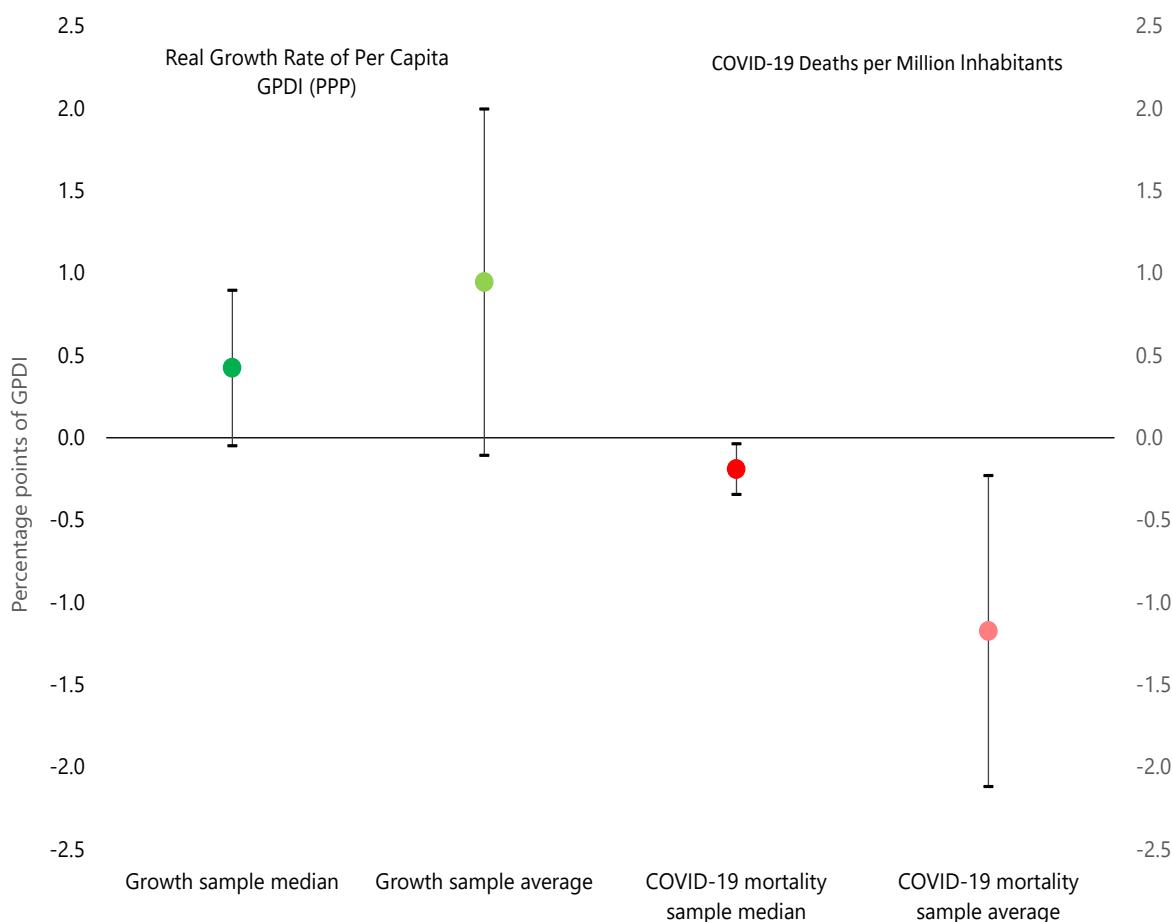
On COVID-19, our results suggest that private saving rates have, on average, not increased or even marginally declined in SSA during the pandemic period. Our econometric exercise indicates that the number of COVID-19 deaths per million people (i.e., a proxy for COVID-19 *mortality* in our sample country) is statistically significant and negatively associated with the *change* in private savings in SSA. As Figure 7 displays, the quantitative results suggests that every 10 cumulative deaths of COVID-19 per million inhabitants (which is around the median value of that variable between 2020–21 in SSA) is, *ceteris paribus* and on average, associated with an decrease in around 0.2 percentage points of GDP in the change of the private savings rate. If one uses 59 deaths of COVID-19 per million inhabitants (which is approximately the average value of that variable between 2020–21 in SSA), that measure of mortality implies, *ceteris paribus*, a decline of close to 1.2 percentage points of GDP in the change of SSA's private savings rate. Such macro-level descriptive statistics and econometric results are corroborated by our micro analysis of household surveys in selected SSA economies (see also WBSI and MasterCard Foundation, 2020), which point to the nefast effect of COVID-19 in those economies at the micro (household) level.²⁹

It is important to note that our findings regarding the impacts of COVID-19 on private savings are in stark contrast with those for AEs (e.g., McGregor, Suphaphiphat, and Toscani, 2022) and reinforce the call to support all initiatives to reduce the spread of COVID-19 in the SSA region. Private savings are a key source of financing to support the post-pandemic relaunching of the SSA economies and to move towards the SDGs (Gaspar et al., 2019; and Benedek et al., 2021). Moreover, the depletion of household savings and increase in poverty should be tackled through well-targeted social spending and poverty-reduction programs that could assist those households during the economic recovery period, avoiding longer-term negative impacts and risks of the pandemic (Agarwal and others, 2022), including in terms of income inequality and of development of the region. Accordingly, various multilateral institutions and development agencies have called for substantial and well-targeted social and financial supports from African governments to the most vulnerable population (see UN, 2020; and IMF, 2021a).

Several directions for further research could be pursued. For instance, future research could investigate the association between private investment and private savings in SSA and how Covid-19 may have affected that dynamics. A more detailed analysis of the impacts of COVID-19 on private savings examining further microdata or macrodata with higher frequency (e.g., quarterly) could also be explored. This could shed more light on the transmission channels of the pandemic into private savings rate and private investment in SSA.

²⁹ Recent research on other impacts of the pandemic in Africa and LICs (see Miguel and Mushfiq Mobarak, 2021; and Buffie et al., 2022) corroborate this hypothesis that poor families (particularly women) have been the most impacted by COVID-19. In Tanzania, for example, preliminary estimates from high-frequency phone surveys conducted in April and May of 2021 show that 64 percent of female-headed households reported declines in income from investments or savings since the onset of the pandemic, versus just 37 percent of male-headed households (World Bank, 2022).

Figure 7. Estimated Effect on Real Growth Rate of Per Capita GDP and of COVID-19 Mortality on the Private Savings in SSA Economies*



Source: Authors' calculations.

Notes: * Dots in the chart represent the multiplication of the estimated coefficients in Table 1 and Table 4 by the average and the median of the variables (*real per capita GDP growth in PPP terms* and *COVID-19 deaths per million inhabitants*), respectively (see Table C in Annex II for the SSA sample descriptive statistics). Vertical lines illustrate the confidence intervals of the simulation with a significance level of 5 percent ($\alpha = 0.05$) of rejecting the null hypothesis when it is true. It is further important to remind that while the results using *real per capita GDP growth* are estimated with the private savings rate in levels, the results using *COVID-19 deaths per million inhabitants* are estimated with private savings rate in first differences.

Annex I. Country Groups and Sample

Table A. Country Groups Used in the Stylized Facts

Groups ^a		Countries ^b
SSA	SSA fragile	Burundi*, Central African Republic*, Chad*, Comoros*, Congo (Democratic Republic of the)*, Congo (Republic of)*, Côte d'Ivoire*, Eritrea*, Gambia*, Guinea*, Guinea-Bissau*, Liberia*, Malawi*, Mali*, São Tomé and Príncipe*, Sierra Leone*, South Sudan*, Togo*, Zimbabwe*
	SSA frontier	Angola, Cameroon*, Côte d'Ivoire*, Ethiopia*, Gabon, Ghana*, Kenya*, Mauritius, Mozambique*, Namibia, Nigeria*, Rwanda*, Senegal*, Tanzania*, Zambia*
	SSA MICs	Angola, Botswana, Cabo Verde, Cameroon*, Comoros*, Congo (Republic of)*, Côte d'Ivoire*, Equatorial Guinea, Gabon, Ghana*, Kenya*, Lesotho*, Mauritius, Namibia, Nigeria*, São Tomé and Príncipe*, Senegal*, Seychelles, South Africa, Swaziland, Zambia*
	SSA Non-RICs	Benin*, Burundi*, Cabo Verde, Comoros*, Côte d'Ivoire*, Eritrea*, Ethiopia*, Gambia*, Guinea-Bissau*, Kenya*, Lesotho*, Madagascar*, Malawi*, Mauritius, Mozambique*, Rwanda*, São Tomé and Príncipe*, Senegal*, Seychelles, Swaziland, Togo*, Uganda*
	SSA Oil Exporters	Angola, Cameroon*, Chad*, Congo (Republic of)*, Equatorial Guinea, Gabon, Nigeria*, South Sudan*
	SSA RICS	Botswana, Burkina Faso*, Central African Republic*, Congo (Democratic Republic of the)*, Ghana*, Guinea*, Liberia*, Mali*, Namibia, Niger*, Sierra Leone*, South Africa, Tanzania*, Zambia*, Zimbabwe*
EMDEs (excluding SSA)	ASIA	Brunei Darussalam, Bangladesh*, Bhutan*, China, Fiji, Micronesia, Indonesia, India, Cambodia*, Kiribati*, Lao P.D.R.*, Maldives, Sri Lanka, Myanmar*, Mongolia*, Malaysia, Philippines, Nepal*, Papua New Guinea*, Palau, Solomon Islands*, Thailand, Timor-Leste, Tonga, Vietnam*
	CIS	Armenia, Azerbaijan, Belarus, Georgia, Kazakhstan, Kyrgyz Republic*, Moldova*, Russia, Tajikistan*, Turkmenistan, Ukraine, Uzbekistan*
	EUR	Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Hungary, Kosovo, Macedonia (FYR), Montenegro (Republic of), Poland, Romania, Serbia, Turkey
	LAC	Antigua and Barbuda, Argentina, Bahamas, The, Barbados, Belize, Bolivia, Brazil, Chile, Colombia, Costa Rica, Dominica, Dominican Republic, Ecuador, Grenada, Guatemala, Guyana, Haiti, Honduras, Jamaica, Mexico, St. Kitts and Nevis, St. Lucia, Nicaragua, Panama, Peru, Paraguay, El Salvador, Suriname, Trinidad and Tobago, Uruguay, St. Vincent and the Grenadines, Venezuela
	MENAP	Afghanistan, Algeria, Bahrain, Djibouti*, Egypt, Iran, Iraq, Jordan, Kuwait, Lebanon, Libya, Mauritania*, Morocco, Oman, Pakistan, Qatar, Saudi Arabia, Sudan*, Syria, Tunisia, United Arab Emirates, Yemen*
AEs	Australia, Austria, Belgium, Canada, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hong Kong (SAR), Iceland, Ireland, Israel, Italy, Japan, Korea, Latvia, Lithuania, Luxembourg, Malta, Netherlands, New Zealand, Norway, Portugal, San Marino, Singapore, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Taiwan Prov. of China, United Kingdom, United States	

Source: Authors' calculations.

Notes: ^a Group of countries according to their use in different analytical exercises. SSA = Sub-Saharan Africa; EMDEs = Emerging and Developing Economies; AEs = Advanced Economies; SSA fragile = SSA fragile states; SSA frontier = SSA frontier markets; SSA MICs = SSA middle-income countries; SSA Non-RICs = SSA non-resource-intensive countries; SSA RICS = SSA resource-intensive countries; ASIA = developing Asia countries; CIS = Commonwealth of Independent States; EUR = Emerging European economies; LAC = Latin American countries; MENAP = Middle East, North Africa, Afghanistan, and Pakistan.

^b Asterisk (*) indicates that countries that belong to the (low-income countries) LICs group.

Table B. Country Sample Used in the Estimations

Groups ^a		Countries ^b	Estimations ^c					
			I	II	III	IV	V	VI
Full sample	SSA	Benin*, Burkina Faso*, Burundi*, Central African Republic*, Chad*, Côte d'Ivoire*, Republic of Congo*, Ghana*, Lesotho*, Madagascar*, Mali*, Mozambique*, Namibia, Niger*, Rwanda*, Senegal*, Sierra Leone*, Togo*, Uganda*, Zambia*	X	X	X	X	X	X
		South Africa	X	X		X		
		Angola, Botswana, Cameroon*, Eritrea*, Kenya*, Nigeria*, Tanzania* Ethiopia*, Guinea*, Malawi*	X			X		
	LICS (excluding SSA)	Afghanistan#, Cambodia#, Kyrgyz Republic#, Mauritania#, Mongolia#, Myanmar#, Nepal# Bangladesh#, Bolivia#, Haiti#, Honduras#, Nicaragua#, Papua New Guinea#, Sudan#, Vietnam#, Yemen#	X	X				
	EMDEs not in SSA (excluding LICs)	Albania, Algeria, Bosnia and Herzegovina, Bulgaria, Croatia, Egypt, India, Indonesia, Iraq, Jordan, Kuwait, Lebanon, Macedonia (FYR), Malaysia, Morocco, Oman, Pakistan, Peru, Philippines, Poland, Romania, Russia, Saudi Arabia, Serbia, Sri Lanka, Thailand, Trinidad and Tobago, Tunisia, Uruguay Argentina, Armenia, Azerbaijan, Chile, China, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Guatemala, Hungary, Iran, Kazakhstan, Mexico, Panama, Paraguay, Syria, Turkey, United Arab Emirates, Venezuela	X	X				
AEs	Australia, Austria, Belgium, Canada, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hong Kong SAR, Ireland, Israel, Italy, Japan, Korea, Latvia, Lithuania, Netherlands, New Zealand, Norway, Portugal, Singapore, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, United Kingdom, United States	X						

Source: Authors' calculations

Notes: ^a Group of countries according to their use in different analytical exercises. SSA = Sub-Saharan Africa; LICs = Low-Income Countries;

EMDEs = Emerging and Developing Economies; AEs = Advanced Economies. ^b For each country group, each row indicates the list of countries that entered in each type of estimation. Asterisk (*) indicates that the particular SSA country belongs to the LICs group used in the estimations too. Hashtag (#) indicates that the LIC country belongs to the EMDE group used in estimations too. ^c Estimation performed: I = baseline and additional tests estimations (Tables 1 and 2); II = COVID-19 estimations (Tables 3 to 7); III = robustness check of the baseline estimation using the ratio to GDP (Table 8); IV = robustness checks of the COVID-19 estimations using the ratio to GDP (Table 8); V = robustness check of the baseline estimation using the Bank Deposits as a ratio of Money Base (Table 9); VI = robustness check of the COVID-19 estimations using the Bank Deposits as a ratio of Money Base (Table 9).

Annex II. Descriptive Statistics

Table A. Descriptive Statistics for the Variables Used in the SSA Estimations

Variables	Year(s)	Mean	Median	Standard deviation	25th percentile	75th percentile	Countries	Obs.
<i>Dependent variable</i>								
Private savings, percent of gross private domestic investment	1983–2019	12.92	12.00	13.25	5.51	19.45	31	959
Lag private savings, percent of gross private domestic investment	1983–2019	12.67	11.58	13.40	5.10	19.13	31	959
First-difference in private savings, percentage points of gross private domestic investment	2017–2019	0.32	-0.26	4.97	-1.85	2.30	20	53
Private savings, percent of GDP	1983–2019	12.30	10.36	12.60	4.58	17.57	31	903
Lag private savings, percent of GDP	1983–2019	12.17	10.09	12.83	4.42	17.31	31	903
First-difference in private savings, percentage points of GDP	2017–2019	0.18	0.00	4.10	-1.93	2.11	21	56
Private savings, percent of gross private domestic investment	2020–2021	16.68	17.95	8.18	13.45	22.63	14	27
Lag private savings, percent of gross private domestic investment	2020–2021	17.44	18.51	6.88	15.49	20.49	14	27
First-difference in private savings, percentage points of gross private domestic investment	2020–2021	-0.76	-0.09	4.93	-2.17	3.09	13	26
Private savings, percent of GDP	2020–2021	15.64	16.25	8.39	11.33	21.22	18	36
Lag private savings, percent of GDP	2020–2021	15.67	16.10	8.36	13.40	20.83	18	36
First-difference in private savings, percentage points of GDP	2020–2021	-0.55	-0.22	4.12	-1.97	2.63	13	26
<i>Covid-19-related variables</i>								
Covid-19 country cases, per million country inhabitants	2017–2019	0	0	0	0	0	20	53
Covid-19 country cases, per million country inhabitants	2020–2021	4,190	946	11,024	439	3,315	13	26
Covid-19 country deaths, per million country inhabitants	2017–2019	0	0	0	0	0	20	53
Covid-19 country deaths, per million country inhabitants	2020–2021	59	10	196	5	36	13	26
Vaccination shots per country, percent of the population	2017–2019	0	0	0	0	0	20	53
Vaccination shots per country, percent of the population	2020–2021	5	0	10	0	8	13	26
Stringency of lockdown measures, index number	2017–2019	0.00	0.00	0.00	0.00	0.00	20	51
Stringency of lockdown measures, index number	2020–2021	40.07	41.94	14.41	29.58	47.81	13	26
<i>Baseline controls</i>								
Inflation (percent)	1983–2019	9.32	6.41	13.54	2.11	12.04	31	959
Inflation (percent)	2020–2021	3.44	2.70	2.20	2.20	4.19	14	27
Flow of private sector credit, percent of gross private domestic investment	1983–2019	2.29	1.53	4.44	0.40	3.34	31	959
Flow of private sector credit, percent of gross private domestic investment	2020–2021	0.55	0.99	2.32	-0.78	1.79	14	27
Public saving/GPDI	1983–2019	5.56	3.49	12.17	0.39	7.97	31	959
Public saving/GPDI	2020–2021	0.96	2.86	6.77	0.79	4.54	14	27
Real GDP per capita (PPP), US dollars	1983–2019	3,806.83	911.86	38,957.78	592.80	1,513.52	31	959
Real GDP per capita (PPP), US dollars	2020–2021	1,318.38	1,317.93	950.82	617.84	2,154.35	14	27
Real growth rate of per capita GDP (PPP), percent	1983–2019	2.06	0.92	17.70	-3.81	5.72	31	959
Real growth rate of per capita GDP (PPP), percent	2020–2021	-2.02	-2.23	4.21	-4.60	1.35	14	27
Share of urban population	1983–2019	31.57	31.58	14.45	19.26	40.90	31	959
Share of urban population	2020–2021	36.64	38.53	13.90	24.95	48.42	14	27
Terms of trade, percent	1983–2019	119.90	106.82	55.52	93.52	132.55	31	959
Terms of trade, percent	2020–2021	171.45	129.31	92.89	107.99	229.40	14	27
<i>Additional variables and controls</i>								
Bank deposits (liabilities to other depository corporations, as percent of monetary base)	2002–2019	31.33	27.81	17.38	19.83	38.02	20	473
First-difference of bank deposits, percentage points of monetary base	2017–2019	-0.42	0.37	5.40	-2.71	2.85	20	53
Bank deposits (liabilities to other depository corporations, as percent of monetary base)	2020	34.96	28.69	17.62	24.57	42.71	18	18
First-difference of bank deposits, percentage points of monetary base	2020	2.68	1.85	6.01	-2.26	6.51	13	13
Conflict	1983–2021	0.03	0.00	0.18	0.00	0.00	32	1,064
Current account balance, percent of GPDI	1983–2021	-0.09	-0.05	0.67	-0.10	-0.02	31	986
Economic uncertainty	1983–2021	0.14	0.11	0.14	0.04	0.20	31	986
Foreign aid, percent of GPDI	1983–2021	12.84	10.70	11.06	5.37	17.10	30	929
Flow of private sector credit, percent of GDP	1983–2021	0.18	0.23	2.85	-0.70	1.21	31	939
GPDI (permanent component in log)	1983–2021	13.74	14.04	2.35	12.47	15.37	31	889
GPDI (temporary component in log)	1983–2021	11.76	12.00	2.22	10.79	13.22	30	499
Informality, [scale]	1991–2017	38.59	38.01	7.78	33.40	42.30	31	745
Old-age dependency ratio	1983–2021	5.73	5.60	0.98	5.07	6.31	31	986
Population per country, millions of people	1983–2019	17.29	10.58	24.48	5.46	19.31	31	959
Population per country, millions of people	2020–2021	20.43	20.25	10.56	12.23	27.66	14	27
Public saving/GDP	1983–2021	2.47	2.48	7.93	0.00	5.48	31	939
Real growth rate of per capita GDP (PPP), percent	1983–2021	-3.75	-2.50	9.49	-7.68	2.03	31	939
Real GDP growth (5-year forecast), percent	1990–2021	0.30	0.29	0.11	0.24	0.35	33	840
Terms of trade (permanent component), index number	1983–2021	472.22	469.05	27.90	456.97	483.06	31	986
Terms of trade (temporary component), index number	1983–2021	-0.16	-1.00	21.61	-11.28	10.78	31	986
Unanticipated income growth, percentage points	1983–2021	0.05	-0.01	6.43	-2.14	2.04	31	986
Unanticipated inflation, percentage points	1983–2021	-0.36	-0.18	8.54	-3.01	2.46	31	985
Young-age dependency ratio	1983–2021	85.36	86.41	11.14	80.23	92.56	31	986

Sources: WEO database; WDI database; Grigoli et al. (2018); Gruss et al. (2020); Hale et al. (2021); Mathieu et al. (2021); Ritchie et al. (2020);

Note: Despite of the variables in first-differences, all other statistics are based on the estimated sample for level of savings (as a ratio to GPDI or GDP). Obs. = observations.

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