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The determinants of domestic savings in Cameroon: what role for institutions?

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Abstract: Domestic resource mobilization has rightly been placed at the centre of the 'financing for development' agenda across developing countries. While much is known about the importance of domestic taxes in contributing to this agenda, little is known about the potential importance of domestic savings, for which understanding its determinants is crucial. This paper fills that gap by identifying the robust determinants of domestic savings in Cameroon. We employ the autoregressive distributed lag model on annual data over the period from 1980 to 2018 to ascertain the robust determinants of two savings aggregates: private savings and gross savings. The empirical analysis shows that the determinants of private and gross savings are broadly the same: per capita income, income growth, and domestic credit to the private sector are associated with increases in both savings aggregates. The analysis also shows that institutions, specifically political corruption and rule of law, are themselves important determinants of savings. Finally, the analysis shows that the strong oil price hikes of the early 1980s had a direct positive impact on both savings aggregates as well as a positive impact through terms of trade.

Key words: domestic resource mobilization, domestic savings, institutions, private savings

JEL classification: C32, E21, E44, G51

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1 Introduction

Domestic savings play a crucial role in the economic development process of countries. By increasing productivity and production in a given country, domestic savings contribute to financial capital accumulation, which is essential for development and increases the availability of capital for investment. Cross-country research has consistently found investment to be a key determinant of economic growth. While there is ambiguity about the direction of causality between domestic savings and growth (see Elbadawi and Mwega 2000 for a brief review), there is an unambiguous relationship between savings and growth (Ang and Sen 2011; Sen 2023). Additionally, high savings rates are associated with high domestic investment rates, as the latter act as a buffer against sudden reversals in international capital flows (e.g. foreign direct investment (FDI) and portfolio flows) as well as ongoing declines in overseas development assistance and remittances.

The empirical literature which estimates the determinants of savings falls into one of two types: cross-country regressions and country studies. The cross-country literature postulates various factors as determinants of cross-country private and gross savings, including: (i) economic factors such as gross domestic product (GDP) per capita, economic growth, and household incomes (Ang 2011; Athukorala and Sen 2004; Athukorala and Suanin 2024); (ii) financial sector variables such as interest rates, broad money (i.e. money supply), and domestic credit to the private sector (Kelly and Mavrotas 2008; Loayza et al. 2000; Nagawa et al. 2020); (iii) macroeconomic variables such as inflation, terms of trade shocks, and remittances (Ang and Sen 2011; Chowdury 2015); and (iv) institutional variables such as trust in public institutions, corruption, government effectiveness, and government stability (Boateng et al. 2019; Facchini et al. 2024; Freytag and Voll 2013; Swaleheen 2008). While the above have been shown to be standard determinants of private and gross savings within and across countries, research also shows that there are idiosyncratic (context-specific) determinants of private savings that differ from those of government savings.

Financial sector policies targeted at promoting incentives to save (e.g., financial sector liberalization episodes, the adoption of fintech, and the development of long-term capital markets) are what drive private savings, while the overarching involvement of the state (i.e. domestic political economy factors) is most crucial for gross savings. These context-specific factors, which are the result of reforms implemented in different ways at varying speeds and with varying levels of political commitment, are more easily incorporated into country studies. This paper is linked to this group of studies. The paper contributes to the literature by estimating the robust determinants of private and gross savings in Cameroon over the period from 1980 to 2018, distinguishing between the standard and idiosyncratic determinants that are important in the Cameroonian context.

We focus on Cameroon for three reasons. First, Cameroon has a high level of savings but low growth in savings. Second, Cameroon is a resource-rich country that has historically depended on the production and exports of primary commodities for foreign exchange and government revenue. The performance of these primary commodities—whose prices are determined on international markets—are susceptible to the vagaries of international movements and leave the countries vulnerable to external shocks (especially terms of trade shocks). This can impact savings if economic agents smooth their consumption to guard against volatile commodity prices, or if changes in governments' fortunes alter public savings ratios (as expected). Third, institutional quality in Cameroon is low compared to peer countries. The country characteristically ranks badly in various rankings of institutional quality. For example, in 2022, Cameroon ranked 142nd out of 180 countries (up from 144th in 2021) in Transparency International's (TI) corruption perceptions index (CPI). For 2022 the Varieties of Democracy (V-Dem) regime corruption index puts

Cameroon at 0.926 (for context Denmark, which ranked first on TI's CPI has 0.002) and the rule of law index at 0.103 (0.998 for Denmark).

There are three elements to the analysis. First, we employ the autoregressive distributed lag (ARDL) estimation method to ascertain the impact of various economic, financial sector, macroeconomic, and institutional variables on savings aggregates in Cameroon. The ARDL method is attractive as it permits estimation of a long-run equilibrium (i.e. cointegrating) relationship between savings aggregates and their determinants and a distinction between long-run and short-run effects (by estimating an error correction model), while being theoretically agnostic about the order of integration of key variables, and it permits analysis of the dynamics of the error correction term. Our primary findings show that there is a cointegrating relationship between both savings aggregates and their determinants. In addition both long-run and short-run effects match a priori expectations. Second, we incorporate various measures of institutional quality to gauge their direct impacts on savings aggregates. We find that the primary measure of corruption (i.e. the political corruption index) reduces savings aggregates, while the rule of law index is associated with higher savings. Third, we attempt to isolate the impact on savings aggregates of various global shocks and specific financial sector reforms, specifically the oil price hike of the early 1980s, the devaluation of the CFA franc in 1994, the 2008 global financial crisis, and the introduction of mobile money in 2012. We find the shock variables not to be particularly important (the oil price hike was associated with higher private savings), and we find a significant impact of the oil price hike on savings through its impact on terms of trade shocks. The CFA devaluation, the global financial crisis, and the introduction of mobile money all have no discernible impact on savings aggregates.

The rest of the paper is organized as follows. Section 2 describes the policy context that underpins the evolution of savings in Cameroon, distinguishing between macroeconomic and financial sector policies. Section 3 discusses the analytical framework that underpins the economic analysis and the data and introduces the empirical specification. Section 4 presents findings on the time series properties of the data, focusing on unit roots and cointegration tests. Section 5 presents the main results and some robustness checks and extensions. Section 6 summarizes the findings and concludes.

2 Policy context: evolution of savings and associated performance in Cameroon

2.1 Macroeconomic policy context

The oil sector was the main source of foreign exchange in the early 1980s, contributing most to the country's foreign exchange (Khan 2011). Nevertheless agriculture was still a fundamental cornerstone of the economy, specifically through foreign exchange earnings from primary crops like cotton, cocoa, and coffee. The increase in oil prices from the late 1970s resulted in the oil sector contributing significantly more to government revenue (through a threefold increase in export revenue), with the sector's contribution rising from 9% in 1980 to 41% in 1985 (Khan 2011). The increased oil revenues in the country mostly reflected the strong increase in foreign investment during that period, as most foreign investment was directed towards the booming natural resource sector. The surge in oil revenues contributed to an expansionary fiscal policy during that period, with government investment—especially in physical infrastructure and the manufacturing sector—increasing significantly and also as part of an import-substitution industrialization strategy. This was achieved through increased spending on the manufacturing and agro-industrial sectors, regularly supported by government subsidies.

The prices of primary commodity exports slumped considerably after 1986, resulting in a deterioration in terms of trade (export earnings dropped considerably) which plunged the country into a crisis. The economic effects were dire: export earnings, economic activity, and consequently economic growth shrank (the latter dropped by about 4%), FDI and other private capital flows plummeted, production of major cash crops dropped, and the real effective exchange rate appreciated (IMF 1996; Khan 2011).[1] The drop in government revenues, coupled with the procyclical increase in spending during the oil boom years, resulted in huge fiscal deficits which were ultimately financed by government loans (i.e. external and domestic borrowing). While these debts reduced the fiscal deficit, the loans invariably increased the debt stock and the interest rates on the loans increased debt service costs, resulting in huge domestic and external arrears as well as depleted foreign exchange reserves. This economic condition underscored Cameroon's rapprochement with the International Monetary Fund (IMF) and World Bank, ultimately attracting a special drawing right worth US$62 million and a structural adjustment loan worth US$150 million.[2]

The economic crises which had dampened the external competitiveness of the country and contributed to an over-appreciated exchange rate ultimately culminated in the devaluation of the CFA Franc in 1994. The devaluation—accompanied by financial assistance, especially from multilateral donors—produced major upturns in economic activity in Cameroon, primarily through increased external competitiveness in export-oriented and import-substitution sectors, and hence improved terms of trade and economic growth (IMF 1996). Domestic demand increased following the devaluation, reflecting steady increases in both domestic consumption and investment. The containment of inflation, aided by the abundance of goods and services in the country and a containment of unit labour costs, also contributed to the upturn. Due to budget constraints and as part of the structural adjustment programme, public investment and consumption declined while private sector investment and consumption increased (Fielding 1995). The private sector thus contributed more to the expansion of domestic investment during the post-devaluation period.

The fiscal deficit was ultimately reversed to a surplus, with total government revenue increasing while total expenditure declined (IMF 1996). In the wake of the devaluation, and despite widespread tax evasion and the granting of discretionary tax exemptions, the government introduced several indirect tax reforms which contributed to boosting non-oil domestic revenues.[3] The rebound in non-oil exports—buttressed by the enhanced external competitiveness in the country and improved world prices—also contributed significantly to the increase in non-oil revenue mobilization. Timber played a dominant role, while export receipts from the primary commodity exports (i.e. cocoa, coffee, and cotton) also increased. Total oil revenue also increased, driven by two factors: the total surplus from the national oil company (SNH) was transferred to the central government budget, and there was a mild upturn in oil prices. Unstable non-interest expenditures, including civil servants' salaries and higher defence spending, created rigidity in government spending, albeit not enough to countervail the overall stability of government spending.

The devaluation, however, did not significantly alter the burden of debt (especially external debt) as debt soared considerably during that period. By the end of June 1999, total external debt

[1] These economic effects contributed to declining income, hence consumption and social safety nets.

[2] The loan was preceded by a debt rescheduling episode involving the national authorities and Paris Club creditors.

[3] The reforms included (IMF 1996): the creation of two large taxpayer units in Douala and Yaoundé, an increased turnover rate from 12.5 to 15%, and extension of the common tax or tariff regime to include public enterprises.

amounted to US$7.8 billion—the present value of the debt-to-exports ratio exceeded 150%, while the present value of the debt-to-revenue ratio exceeded 250% (Khan 2011). This huge debt burden forced the country's admission into the Highly Indebted Poor Country (HIPC) initiative in 2000. The government implemented economic reforms to stabilize the economy, albeit with recurrent slippages due to governance-related drawbacks, and ultimately reached the HIPC completion point in 2006. Reaching the HIPC completion point made the country automatically eligible for the Multilateral Debt Relief Initiative. The completion point was important as the debt relief opened up significant fiscal space which the government could use to boost investment, increase civil servants' wages, and expand other social sector spending to alleviate cost-of-living pressures which had started to take hold (IMF 2007; Khan 2011). The additional fiscal space was, nonetheless, badly managed and the sustained increase in the cost of living (itself fuelled by increases in commodity prices, hence food inflation) resulted in demonstrations in February 2008. The government ultimately quelled the demonstrations by promoting economic measures such as reductions in prices of essential goods and increases in civil servants' salaries (IMF 2009).

The security situation in some regions of Cameroon has become progressively more precarious, resulting in deteriorating economic outcomes and widening fiscal deficits (mostly driven by increased social sector and security spending). Terrorist or insurgent activities in the Lake Chad basin, perpetuated by the scourge of Boko Haram, and increasing insecurity in the Central African Republic have led to a surge in the number of refugees and internally displaced persons. Relatively recently, the crisis in the two Anglophone regions has intensified, compounding the significant security challenges already faced in other regions (IMF 2018a, 2019). The social unrest, which occasionally evolves into violent clashes between the government and splintered separatist groups, disrupts economic activity and weakens growth. This also makes it more difficult to collect taxes from obvious tax bases, while the government's legitimacy in the restive anglophone regions is eroded, contributing to low tax compliance. There has also been a huge increase in military spending to counter the impact of insurgents in the restive regions (thus diverting scarce government finances from where they may be most needed) as well as increases in social spending to deal with spiking internally displaced populations.

2.2 Financial sector policy context

Cameroon's financial system is the largest in the Economic Community of Central African States (CEMAC) and accounts for more than half of the region's financial assets (IMF 2014). The financial system is dominated by commercial banks—total bank assets accounted for 70% of total financial sector assets and 27% of GDP in 2017—although the system is highly concentrated and ultimately prone to concentration-related vulnerabilities. As of 2017 the four largest banks accounted for 59% of the total market share and the two largest cities, Yaoundé and Douala, generated up to 90% of total bank credits and deposits (IMF 2018b).[4, 5] The banking system remains shallow, with private sector credit to GDP considerably lower when compared to peer countries.

[4] The financial sector also includes insurance companies, microfinance institutions, a stock exchange (i.e. the Douala Stock Exchange), government-owned specialized financial institutions, and non-banking financial institutions or informal services, the most popular of which are the *njangui*. In addition a large proportion of the commercial banks are foreign-owned, e.g., CitiBank, ECOBANK, and United Bank of Africa, most of which are better capitalized (with higher capital adequacy ratios than domestic-owned banks, typically above 8%) than domestically owned banks.

[5] Most other financial sector entities suffer from chronically weak governance and oversight and operating losses. These include the Cameroonian Postal Service (CAMPOST) and the state-owned mortgage institution, *Crédit Foncier du Cameroun*, both of which have non-performing loans more than a quarter of their total assets.

The financial sector was not detached from the economic crisis that gripped the Cameroonian economy in the 1980s. Financial repression by the government, through huge government interference in banks' lending policies and the government's (majority) ownership of banks, added to weak supervisory frameworks, poor management, and excessive risk concentration, and a weak judicial system, contributed to the crisis in the financial sector (Khan 2011; IMF 2007). This resulted in liquidity and solvency problems in the sector which affected commercial banks (e.g. huge undercapitalization of banks) as well as non-bank financial institutions (IMF 2007). Structural Adjustment Program (SAP) reforms also extended to the financial sector, specifically through measures focused on reducing the government's share in the capital of financial institutions (and withdrawing altogether from their management), liquidation of banks, restructuring (with higher branch concentration in major cities), privatization of non-performing institutions, and the issuance of government securities to commercial banks. The creation of the Central African Banking Commission (COBAC) was instrumental in the reform of the financial sector, with the institution tasked with enforcing the regulatory dispositions put in place.[6]

The microfinance sector has increasingly contributed more to the financial system's assets in Cameroon, rising from less than 5% in 2005 (Khan 2011). Their increased activity reflected commercial banks' inability or unwillingness to provide credit to the poor and micro, small, and medium-sized enterprises (MSMEs) and an increasingly rich middle class, as well as a decline in bank penetration which resulted from the structural adjustment. However, the surge in microfinance institutions is not without structural and regulatory drawbacks, such as low capitalization and its limited ability to finance long-term development, weak credit risk assessment, poor governance (owner interventionism is endemic), and fragmented regulatory frameworks (limited supervision). In addition, and because of their lack of supervision, lending rates in microfinance institutions are very high, while their deposit rates are considerably low relative to commercial banks. These large interest rate differentials point to low financial intermediation in the financial sector (IMF 2009).[7]

Low financial inclusion also results from the prevalence of informal financing institutions, which can be distinguished between commercial and non-commercial financial institutions (Nissanke and Aryeetey 2008). The former are transactions conducted by traders, money lenders, and estate collectors; the non-commercial transactions are those between relatives, friends, and other small-scale groups. The most popular non-commercial informal financial service is the *njangui*, a community-based system of saving and lending money at concessional interest rates (i.e. rates lower than the market rates) with little or no collateral requirements.[8] While these informal institutions tend to offset low access to formal finance, they perpetuate the use of cash transactions as they are mostly unknown to the authorities and ultimately play a key financial intermediary role in the sector.

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[6] One of the most significant changes introduced by COBAC was the abolition of the maximum lending rate by banks (which stood at 15%), which was considered insufficient to countervail perceived risks of lending (particularly to small and medium-sized enterprises).

[7] The Cameroonian government, upon suggestion from COBAC, set up a new bank for MSMEs in 2014. The bank was set up to cater to specific needs of MSMEs and its seed capital of CFAF10 billion was totally subscribed by the Cameroonian government (IMF 2014). It is unclear what impact, if any, this bank has had in galvanizing credit to the specific target group.

[8] These *njanguis* offer three types of financial instrument (IMF 2018b): periodic contributions (typically monthly), savings and loans, and solidarity funds. The *njanguis* are not without challenges, with elevated costs (interest rates on loans tend to be very high with short maturity periods), lack of regulation, small credit size, and susceptibility to insecurity.

Digital finance can contribute significantly to financial inclusion and intermediation under the right environment. Mobile banking was initiated in 2012 and its uptake has been huge: the number of mobile money accounts grew from 9% of adults in 2012 to 20% in 2020; the average number of active agents per km^2 increased from four in 2014 to 230 in 2020; and the number of mobile agent outlets per capita increased from 35 agents in 2014 to 709 in 2020 (IMF 2018b, 2022). The huge uptake can be attributed, in part, to the vast array of services they cover (e.g., money transfer, payment for purchases and shipments, payment of bills, and taxes). Nevertheless digital financial inclusion is still low in Cameroon and mobile money is used primarily as a means of transaction, not saving. Additionally, IMF (2022) shows a significant negative relationship between mobile banking activity and microfinance institution lending activities, suggesting that both substitute for rather than complement each other.

The financial system, however, is still fraught with challenges and vulnerabilities, which muddle its contribution to financial inclusion and intermediation. Despite its bank-dominated financial system, access to finance in Cameroon is very low and unevenly distributed (IMF 2018b). In 2021 bank account ownership was only 9% compared to 14% on average in sub-Saharan Africa. There has been a decline in bank penetration, and there are inefficiencies in the operating environment and difficulties in assessing credit risk. Financial intermediation, which has been shown to contribute to more efficient resource allocation and ultimately economic growth, is low in Cameroon. This has contributed to largely unsuccessful financial sector liberalization in Cameroon. While the level of financial intermediation compares favourably with other CEMAC countries, it is lower than in other peers in sub-Saharan Africa (IMF 2007, 2009). Key indicators of financial intermediation, i.e. broad money, deposits-to-GDP, and domestic credit to the private sector, compare unfavourably to SSA peers.

3 Data and empirical specification

3.1 Analytical framework and data

The lifecycle model (LCM) of savings underpins our empirical analysis. The theory posits that the primary reason for saving is to accumulate capital for retirement (Ando and Modigliani 1963), i.e. the model is premised on the spending and saving habits of economic agents over the course of their lifetimes, incorporating their future incomes. Economic agents, through their consumption or saving behaviour, aim to maximize the net present value of their lifetime utility, subject to a budget constraint which equals the current net worth plus the present value of the expected labour income of the economic agent over their remaining working life. Assuming perfect capital markets and perfect foresight of the agent about the true income-generating process, the LCM theory is able to predict that consumption in a particular period depends on expectations of lifetime incomes (Athukorala and Sen 2004). As the agent's lifetime income fluctuates, their saving behaviour is crucially determined by what stage they are at in their life cycle: during the working years the agent is a net saver and during retirement years becomes a dis-saver.

Modigliani (1993) extends the model to include the economic growth rate and demographic dynamics (i.e. age structure) as main determinants of gross savings, while Athukorala and Sen (2004) extend the model even further to include other variables (discussed below). The Keynesian model postulates that economic growth has predictive power on savings behaviour: higher growth rates can increase disposable income through increased production and productivity, which allows individuals to increase both consumption and savings simultaneously. The population growth rate is used as a proxy for demographic dynamics in a country (Modigliani 1986). The model postulates that population growth caused by increases in age-specific fertility rates increases the number of

savers relative to the number of dis-savers. Nevertheless, there can be a theoretically ambiguous effect when an increase in the population growth rate not only increases the number of economically active individuals relative to those retired but also increases the share of the younger population (as both the young and retired consume more than they earn).

Other determinants of savings include economic, macroeconomic, financial sector, and institutional variables (Boateng et al 2019; Chowdury 2015; Freytag and Voll 2013; Grigoli et al 2016, 2017, 2018; Masson et al. 1998; Sahoo and Dash 2013). The economic variables include GDP per capita and GDP per capita growth. We expect a positive relationship between per capita GDP and savings behaviour, with steady improvements in development levels linked to increases in production and productivity, hence higher disposable incomes and savings rates. In addition GDP per capita can be seen as a proxy for agents' capacity to accumulate capital and save. Likewise, per capita growth is expected to increase savings through economic expansion and its attendant benefits.

The macroeconomic variables include the terms of trade index and inflation (percentage change in the consumer price index). The terms of trade index serves as a useful proxy for macroeconomic uncertainty (Chowdury 2015). Strong fluctuations in tradable commodity prices (especially for natural resource and primary agricultural products, prices of which are determined on international markets) result in volatility in trade balances and government revenues, and potentially impact disposable income and savings behaviour. The net effect, however, depends on the perception of the duration of changes in the terms of trade index, i.e. whether the changes are temporary or permanent. The relationship between private consumption and domestic savings is straightforward: increases in household consumption reduce disposable income that can otherwise be saved, resulting in reduced savings rates. Inflation is a good proxy for the prevailing macroeconomic conditions within an economy, with high inflation implying that people get to spend more of their disposable income, hence they have less savings. Inflation can also reduce savings by increasing the uncertainty about the future value of accumulated savings (which will ultimately be eroded as savings are not indexed to changes in incomes or prices). Conversely, inflation can create uncertainty about future income streams, causing savings to increase on a precautionary or pre-emptive basis (Athukorala and Sen 2004).

Financial sector variables include broad money (% GDP), domestic credit to the private sector (% GDP), and the deposit interest rate.[9] Broad money, a proxy for money supply or financial intermediation depth across countries, increases the willingness of households to save. Domestic credit to the private sector, a proxy for financial depth across countries, measures financial resources provided to the private sector by financial corporations (e.g., through loans, trade credits, and other purchases). Increased credit permits greater investment and expansion of economic activity, resulting in higher (disposable) income, hence more saving.

Institutions are also expected to have a significant impact on private and gross domestic savings. Various proxies for institutional quality are expected to impact savings through different mechanisms, with better institutional quality associated with deeper financial markets across countries. For example, poor rule of law creates weak law enforcement of contracts, which reduces bank credit and increases the cost of financial intermediation. Poor regulatory quality exacerbates the fragmentation of financial markets and products, inflating transaction costs. Conversely, high regulatory quality eases credit constraints, which reduces the cost of doing business in the economy (Feng and Yu 2021). Furthermore, corruption is anathema to all development outcomes as it

[9] Due to unavailability of data none of the interest rate variables were included.

causes inefficiencies and diversion of resources from productive instruments, increases the cost of doing business, limits access to financial resources and markets, and discourages entrepreneurs from investing (Freytag and Voll, 2013; Sahoo and Dash 2013; Sanga and Aziakpono 2022). In this paper, we obtain data from the International Country Risk Guide (ICRG) dataset (ICRG 2018), the World Governance Indicators (WGI) database (World Bank 2024), and the Varieties of Democracy (V-Dem) dataset (Coppedge et al 2023). From the ICRG dataset we obtain data on bureaucratic quality, from the WGI database we obtain data on all measures of institutions, and from the V-Dem dataset we collect data on the political corruption index and the rule of law index.[10]

3.2 Empirical specification

Guided by the theoretical considerations above, we intend to estimate two savings equations using the same set of regressors. The first equation posits the determinants of private savings (*SPV*) as follows:

$$SPRV = f(SPB, GY, GPOP, TOT, FIN, INF, INS, W, GPOP, RID, LY) \quad (1)$$

The second equation posits the determinants of gross national savings (*SNAT*) as follows:

$$SNAT = f(GY, GPOP, TOT, FIN, INF, INS, W, GPOP, RID, LY) \quad (2)$$

where *SPRV*, *SNAT,* and *SPB* are, respectively, the private savings, gross national savings, and public savings ratios (all expressed as a percentage of GDP). The public savings ratio is calculated as the difference between government revenue and government final consumption expenditure (i.e. general government consumption), while private savings is calculated as the difference between gross savings and public savings. *GY* represents the per capita GDP growth rate, while *GPOP* denotes the population growth rate. *LY* is the log of GDP per capita, *TOT* is the terms of trade index, *RID* is the real interest rate, *W* is broad money (a proxy for financial intermediation), *INF* is the rate of inflation (i.e. the percentage change in the consumer price index), *FIN* is domestic credit to the private sector, and *INS* represents measures of institutional quality. All variables are obtained from the World Development Indicators (WDI) database (World Bank 2023), covering the period from 1980 to 2018. Summary statistics, variable definitions and sources and correlations are reported in Appendix Tables A1, A2, and A3.

To estimate equations (1) and (2) above, we employ the ARDL method (Pesaran et al. 2001).[11] The method is suitable for linear time series modelling, particularly given our interest in establishing a long-run relationship between savings aggregates and other macroeconomic and institutional variables. The ARDL method suits our analysis in two key dimensions: first, it is possible to include a mixture of variables with different orders of integration—specifically I(0) and I(1)—in the same model and, second, it permits distinguishing between the long-run and short-run effects of independent variables on savings rates (Keho 2011).

The generalized ARDL (*p,q*) model with *k* explanatory variables is specified thus:

[10] The WGI includes six measures of institutions: voice and accountability, government effectiveness, rule of law, political stability, regulatory quality, and control of corruption.

[11] See Musamali et al. (2022), Were and Joseph (2022), and Ackah and Lambon-Quayefio (2023) for similar analysis focusing on Kenya, Tanzania, and Ghana respectively.

$$SPRV_t = \gamma_0 + \beta_1 SPRV_{t-1} + \cdots + \beta_p SPRV_{t-p} + \alpha_0 X_t + \alpha_1 X_{t-1} + \cdots + \alpha_q X_{t-q} + \varepsilon_t \quad (3)$$

$$SNAT_t = \gamma_0 + \beta_1 SNAT_{t-1} + \cdots + \beta_p SNAT_{t-p} + \alpha_0 X_t + \alpha_1 X_{t-1} + \cdots + \alpha_q X_{t-q} + \varepsilon_t \quad (4)$$

where the dependent variables and their lags are defined as above, X_t is a (*kx1*) matrix of independent variables described above, γ_0 is the constant term, and ε_t is the error term with standard *i.i.d* properties. The dependent variables are explained by lags of themselves (the autoregressive component, included up to lag order *p*), as well as by current and lagged values of independent variables (up to *q* lags). In the presence of cointegration, equations (3) and (4) can be compressed and re-parameterized into an unrestricted error correction model (ECM) of the form:

$$\Delta Y_t = \gamma_0 + \sum_{i=1}^{p} \delta_i \Delta Y_{t-i} + \sum_{i=0}^{q} \delta_i \Delta X_{t-i} + \lambda(Y_t - \theta X_t) + \varepsilon_t \quad (5)$$

where $\lambda = (1 - \sum_{i=1}^{p} \delta_i)$ is the speed of adjustment to equilibrium, the expression in brackets is the long-run (cointegrating) relationship between variables, and $\theta = \frac{\sum_{i=0}^{q} \pi_i}{(1-\sum_{i=1}^{p} \delta_i)}$ is the long-run parameter.[12] If $\lambda = 0$ then there is evidence of a long-run relationship between savings (both private and gross) and their respective determinants. The parameter is expected to be significantly negative under the prior assumption that, following a deviation, the variables return to their long-run equilibrium (cointegration). In addition to the above, the method is more efficient for samples with small-to-moderate time series properties and allows for post-estimation diagnostics to be carried out.[13]

The unrestricted ECM formulation has the following advantages over other dynamic panel methods. First, it permits differentiation between long-run and short-run effects. The intuition is that while short-run deviations may exist (such deviations may result from domestic fiscal policy and financial sector reforms, as well as from the influence of donors through foreign aid disbursements and structural adjustment loans), the variables are expected to co-evolve in the long run. Second, it permits testing for cointegration by analysis of the adjustment coefficient. Third, it allows analysis of the EC term and the speed of adjustment for the economy to the long-run equilibrium.

4 Time series properties of the data

4.1 Tests for stationarity

Time series data is typically characterized by trends (either upwards or downwards) linked to their order of integration, and including variables of different orders of integration in one regression inevitably results in spurious econometric analysis. The ARDL model inherently deals with this issue by permitting a mixture of (at most) I(0) and I(1) variables: i.e. variables stationary in levels or at most first-differenced stationary, respectively.[14] To assess the order of integration of the

[12] The presence of a cointegrating relationship (i.e. an equilibrium long-term relationship) between the dependent and independent variables is a prerequisite for this re-parameterization.

[13] Standard post-estimation diagnostics include normality tests, first- and second-order serial correlation, heteroskedasticity, model misspecification, and model stability tests. See Cameron and Trivedi (2010) for details.

[14] It is important that the variables be, at most, first-difference stationary (i.e. I(1)). In the presence of higher-order levels of integration, e.g. I(2), the critical values of the stationarity tests become invalid.

variables, we employ the augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests. Both tests are for the null hypothesis that the variable series has a unit root (i.e. the variable is non-stationary) against the alternative that the variable is a stationary process (see Tables 1a and 1b for stationarity tests for variables in levels and first differences respectively). The null hypothesis can be rejected (or not) at standard levels of significance or if the absolute value of the test statistic is larger than the critical values at conventional levels of significance. Even after including lags and a trend, some variables are stationary in levels while others are non-stationary (first differencing these non-stationary variables renders them stationary). We conclude that we have a mixture of I(0) and I(1) variables, so the ARDL model is suitable.

Table 1a: Stationarity tests for variables in levels

	ADF test		PP test	
Variable	t-statistic	Critical value (5%)	t-statistic	Critical value (5%)
Private savings	-1.864	-3.564	-3.357	-3.552
Gross savings	-3.482	-3.552**	-4.607***	-3.544
Public savings	-2.969	-3.560	-2.647	-3.552
Log GDP per capita	-2.678	-3.552	-1.249	-3.544
Domestic credit	-1.186	-3.556	-1.101	-3.548
Terms of trade	-2.344	-3.552	-3.639**	-3.544
GDP growth	-2.370	-3.552	-3.581**	-3.544
Inflation (% CPI)	-3.397*	-3.552	-5.454***	-3.544
Broad money	-1.117	-3.556	-1.000	-3.548
Population growth	-2.181	-3.552	-3.773**	-3.544
Urban population	-5.120***	-3.552	-4.942***	-3.544
Household consumption	-3.267*	-3.552	-4.626***	-3.544
Remittances	-2.310	-3.552	-2.696	-3.544
Debt (% GNI)	-2.053	-3.552	-1.463	-3.544
Bureaucratic quality	-1.433	-3.580	-1.692	-3.572
Rule of law index	-1.560	-3.552	-1.647	-3.544
Political corruption index	-1.502	-3.552	-1.934	-3.544

Note: the ADF and PP tests for variables in levels report their respective t-statistics and 5% critical values. CPI is the consumer price index and GNI is gross national income. The optimal lag length is chosen using information criteria (in this table, we report only two lags for variables) and all estimations include a time trend. The null hypothesis of both tests is the presence of a unit root in the variable series, i.e. non-stationarity in the variable series. The decision rule is to reject the null hypothesis when the absolute value of the t-statistic is larger than the absolute value of the test, or to reject the null hypothesis at standard levels of significance. ***$p \leq 0.01$, **$p \leq 0.05$, *$p \leq 0.1$.

Source: authors' construction.

Table 1b: Stationarity tests for variables in first differences

	ADF test		PP test	
Variable	t-statistic	Critical value (5%)	t-statistic	Critical value (5%)
Private savings	-4.346***	-2.975	-10.503***	-2.969
Gross savings	-4.252***	-2.969	-5.981***	-2.964
Public savings	-2.483	-2.975	-6.741***	-2.969
GDP per capita	-2.136	-2.969	-3.346**	-2.964
Domestic credit	-3.293**	-2.972	-4.478***	-2.966
Terms of trade	-6.258***	-2.969	-10.310***	-2.964
GDP growth	-3.490***	-2.969	-11.222***	-2.964
Inflation (% CPI)	-5.465***	-2.969	-10.714***	-2.964
Broad money	-2.657*	-2.975	-5.353***	-2.966
Population growth	-4.202***	-2.969	-2.049	-2.964
Urban population	-2.648*	-2.969	-6.001***	-2.964
Household consumption	-5.671***	-2.969	-9.450***	-2.964
Remittances	-3.357**	-2.969	-9.440***	-2.964
Debt (% GNI)	-2.303	-2.969	-6.104***	-2.964
Bureaucratic quality	-2.643*	-2.989	-3.954***	-2.983
Rule of law index	-2.565	-2.969	-6.376***	-2.964
Political corruption index	-2.790*	-2.969	-5.563***	-2.964

Note: same as for Table 1a above, except that all variables are now in first differences and do not include a time trend.

Source: authors' construction.

4.2 Tests for cointegration

As our variable series are a mixture of I(0) and I(1) processes, the most suitable technique to test for the presence of a long-run relationship amongst the variables is the bounds test for cointegration (Pesaran et al. 2001). The test, which generates an *F*-statistic that is compared with critical value bounds at standard levels of significance, is for a null hypothesis of no long-run (cointegrating) relationship between variables. The test reports lower and upper bounds, i.e. I(0) and I(1), respectively. The decision rule is to reject the null hypothesis if the *F*-statistic is greater than the critical value for I(1) regressors at given levels of significance. [15]

[15] The bounds test also generates a t-statistic which is compared with the critical value bounds. The decision rule is to reject the null hypothesis if the t-statistic is less than the critical value of I(1) regressors at given levels of significance. See Appendix Table A1 for the cointegration test results with the t-statistic.

Table 2: Cointegrating test

	Private savings model		Gross savings model	
	Value	K	Value	K
f-statistic	10.802	6	12.065	5
	Critical value bounds			
Significance	I(0) bound	I(1) bound	I(0) bound	I(1) bound
10%	2.12	3.23	2.26	3.35
5%	2.45	3.61	2.62	3.79
2.5%	2.75	3.99	2.96	4.18
1%	3.15	4.43	3.41	4.68

Note: results from the Pesaran et al. (2001) bounds test are reported for baseline models from Tables 3 and 4. The null hypothesis is for no long-run relationship (i.e. no cointegration) between the dependent variables and their respective determinants. The decision rule is to reject the null hypothesis if the f-statistic is larger than the critical value for I(1) regressors.

Source: authors' construction.

Columns 2 and 3 of Table 2 present the results for private savings, while columns 4 and 5 present the results for gross savings. Both panels show that across various levels of significance, the *F*-statistic is greater than the critical value for I(1) regressors, so we can comfortably reject the null hypothesis of no long-run relationship between the savings aggregates and their respective determinants. This allows us to re-parameterize the ARDL model and estimate it as an ECM.

5 Results

5.1 Baseline results

ECM analysis for private savings

It is necessary to ascertain the validity of an empirical time series model: a valid model is expected to be normal and have no autocorrelation and heteroskedasticity, and the coefficients must be structurally stable. Diagnostic tests to ascertain the viability of the ARDL model are reported in Panel B of Table 3. The Breusch-Godfrey Lagrange Multiplier (LM) test confirms the absence of serial correlation across models, the Breusch-Pagan/Cook-Weisberg test confirms that the models are homoscedastic, and the Jarque-Bera test confirms normality across models. As one can never assume against structural breaks in time series analysis (especially assumptions concerning specific break dates), we check for stability of estimates using the cumulate sum (CUSUM) and cumulative sum of squares (CUSUMSQ) tests. Both plots fall within the boundaries of the 5% significance level, suggesting that the primary model is stable (see Appendix Figure A1).

Panel A of Table 3 shows that in the long run, public savings, GDP per capita growth, terms of trade, domestic credit to the private sector, and inflation are the robust determinants of private savings (column 1). Public savings have a negative impact on private savings, suggesting that in the Cameroonian context, public savings crowd out private savings (see Athukorala and Sen 2004 and Freytag and Voll 2013 for similar findings). This negative relationship can be attributed to the large fiscal deficits that have characterized the Cameroonian economy during the period under review. Strong economic growth reinforces capital accumulation, which expands the amount of credit available for lending to individuals (in addition to other attendant benefits), an effect that can be reinforced by individuals saving more when they know they can easily have access to credit. Also consistent with the lifecycle hypothesis theory, an increase in GDP per capita growth is

associated with increased private savings through higher income per capita permitting increased savings and consumption.

Table 3: Long-run analysis for private savings

	Panel A: Long-run coefficients						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
SPB	-1.227***	-1.088***	-1.127***	-1.253***	-0.587***	-1.212***	-2.078***
	(0.284)	(0.250)	(0.214)	(0.259)	(0.099)	(0.299)	(0.486)
Log GDP per capita	3.298	5.310*	2.589	2.695	0.604	3.426	-7.764
	(2.821)	(2.677)	(3.066)	(2.559)	(0.999)	(3.131)	(4.876)
Domestic credit	0.233***		0.338***	0.151*	-0.059	0.230***	0.164**
	(0.077)		(0.095)	(0.076)	(0.035)	(0.081)	(0.069)
ToT	-0.117**	-0.180***	-0.093**	-.050	-0.054***	-0.116**	-0.123***
	(0.043)	(0.034)	(0.044)	(0.058)	(0.019)	(0.048)	(0.041)
GDP growth	0.383**	0.324**	0.330**	0.385**	-0.024	0.386**	0.642***
	(0.158)	(0.148)	(0.128)	(0.142)	(0.070)	(0.162)	(0.199)
Inflation	0.357***	0.350***	0.334***	0.290***	0.115**	0.354***	0.393***
	(0.078)	(0.073)	(0.066)	(0.076)	(0.051)	(0.086)	(0.079)
Broad money		0.366**					
		(0.132)					
Population growth			-5.466				
			(3.782)				
Urban population				-0.262			
				(0.155)			
Household consumption					-0.804***		
					(0.119)		
Remittances						-0.353	
						(3.464)	
Debt							-0.123**
							(0.045)
Adjustment term	-0.644***	-0.701***	-0.731***	-0.692***	-0.637***	-0.648***	-0.537***
	(0.126)	(0.126)	(0.116)	(0.125)	(0.130)	(0.133)	(0.104)
	Panel B: Diagnostic tests						
R-squared	0.867	0.840	0.890	0.882	0.984	0.867	0.919
LM *p*-value	0.387	0.932	0.163	0.537	0.994	0.364	0.826
BP *p*-value	0.420	0.269	0.313	0.176	0.607	0.229	0.323
JB *p*-value	0.926	0.891	0.989	0.911	0.618	0.931	0.989
Observations	35	35	35	35	35	35	35

Note: panel A reports long-run results from estimating the ARDL with private savings as dependent variable, with column (1) representing the baseline model. Standard errors are reported in parentheses (***p≤0.01, **p≤0.05, *p≤0.1). SPB is the public savings ratio and ToT is the terms of trade index. Panel B reports the diagnostic tests for the various models from columns (1) to (7) (see Cameron and Trivedi 2010 for details). LM *p*-value is for the Breusch-Godfrey LM test for autocorrelation (null hypothesis is no serial correlation), BP *p*-value is for the Breusch-Pagan/Cook-Weisberg test for heteroskedasticity (null hypothesis is homoskedasticity), and JB *p*-value is for the Jarque-Bera normality test (null hypothesis of normality).

Source: authors' construction.

The terms of trade index has a negative relationship with private savings, suggesting that agents increase their savings in response to a terms of trade deterioration. That is, when the terms of trade increases (a deterioration), agents increase their savings to forestall, or at least countervail, the negative impact of the terms of trade increase. Domestic credit to the private sector has a positive relationship with private savings, consistent with the fact that as the financial system improves, i.e. through high levels of private sector increasing growth, it motivates private individuals to save more. Inflation is positively associated with private savings, suggesting that pre-emptive increases in private savings in response to inflation are common in the Cameroonian context.

Institutional variables were introduced independently, and the results can be summarized thus. First, the ICRG variable (bureaucratic quality) was positive but insignificant. Second, the V-Dem variables (political corruption, rule of law, and vertical accountability) were insignificant. Third, all institutional variables from the WGI database were also insignificant.

Table 4: Long-run analysis for private savings, institutions

	Panel A: Long-run coefficients		
	(1)	(2)	(3)
SPB	-0.966***	-1.168***	-1.249***
	(0.284)	(0.263)	(0.271)
Log GDP per capita	4.530	0.136	2.759
	(3.511)	(2.815)	(2.419)
Domestic credit	0.181*	0.035	-0.042
	(0.092)	(0.108)	(0.131)
ToT	-0.143***	-0.038	-0.058
	(0.045)	(0.056)	(0.058)
Growth	0.342**	0.351**	0.439***
	(0.151)	(0.138)	(0.130)
Inflation	0.277**	0.281***	0.339***
	(0.109)	(0.073)	(0.063)
Bureaucratic quality	0.556		
	(0.971)		
Rule of law		0.515	
		(0.315)	
Political corruption			-0.256
			(0.167)
Adjustment term	-0.748***	-0.650***	-0.653***
	(0.157)	(0.115)	(0.101)
	Panel B: Diagnostic tests		
R-squared	0.866	0.908	0.927
LM *p*-value	0.241	0.444	0.433
BP *p*-value	0.723	0.207	0.021
JB *p*-value	0.883	0.676	0.667
Observations	33	35	35

Note: panel A reports long-run results from estimating the ARDL with private savings as dependent variable, with column (1) representing the baseline model. Standard errors are reported in parentheses (***p≤0.01, **p≤0.05, *p≤0.1). SPB is the public savings ratio and ToT is the terms of trade index. Panel B reports the diagnostic tests for the various models from columns (1) to (7) (see Cameron and Trivedi 2010 for details). LM *p*-value is for the Breusch-Godfrey LM test for autocorrelation (null hypothesis is no serial correlation), BP *p*-value is for the Breusch-Pagan/Cook-Weisberg test for heteroskedasticity (null hypothesis is homoskedasticity), and JB *p*-value is for the Jarque-Bera normality test (null hypothesis of normality).

Source: authors' construction.

The short-run results show that only private savings, terms of trade, and inflation have significant effects on private savings (see Appendix Table A2). The lagged change in private savings is associated with lower private savings, while terms of trade has an uncertain impact on private savings as both effects are at play. The immediate short-run effect of terms of trade is positive (which shows that a deterioration of terms of trade results in lower savings if agents are hugely affected by lower commodity prices), while the lagged short-term effect is negative (again, suggesting that agents increase their savings to countervail the effects of terms of trade deteriorations). Inflation also has a negative short-run impact on private savings, suggesting that, in the short run, the opportunity cost of holding liquid assets is higher, resulting in reduced savings. The negative effect may also reflect individuals' inability to adjust to increased costs of living in the short run (changes in cost of living have a huge unexplained component to them).

ECM analysis for gross savings

The diagnostic tests ascertain the suitability of our model with gross savings (Panel B of Table 5): none of the diagnostic tests can reject the respective null hypotheses of normality and heteroskedasticity and both CUSUM and CUSUMSQ plots fall within the boundaries of the 5% significance level (see Appendix Figure A2). The diagnostics, however, reject the null hypothesis of no serial correlation.

Table 5: Long-run analysis for gross savings

	Panel A: Long-run coefficients						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Log GDP per capita	7.662** (3.032)	7.460 (5.677)	11.290*** (3.441)	7.732*** (2.738)	1.561 (3.206)	6.452* (3.401)	14.079*** (3.629)
Domestic credit	0.150*** (0.047)		0.158*** (0.047)	0.017 (0.067)	0.022 (0.068)	0.147*** (0.049)	0.096* (0.052)
ToT	-0.103** (0.044)	-0.101 (0.073)	-0.131*** (0.045)	-0.008 (0.057)	0.069 (0.060)	-0.134** (0.054)	-0.215*** (0.031)
GDP growth	0.438*** (0.124)	0.229 (0.228)	0.415*** (0.124)	0.422*** (0.112)	0.129 (0.163)	0.372** (0.143)	0.516*** (0.093)
Inflation	0.388*** (0.081)	0.497*** (0.162)	0.431*** (0.085)	0.299*** (0.079)	0.149* (0.087)	0.422*** (0.092)	0.471*** (0.025)
Broad money		0.187 (0.192)					
Population growth			-5.540* (2.719)				
Urban population				-0.409** (0.166)			
Household consumption					-0.958*** (0.280)		
Remittances						4.173 (4.019)	
Debt							-0.023 (0.025)
Adjustment term	-0.749*** (0.103)	-0.480*** (0.098)	-0.699*** (0.099)	-0.754*** (0.094)	-0.548*** (0.116)	-0.714*** (0.107)	-0.864*** (0.071)
	Panel B: Diagnostic tests						
R-squared	0.832	0.678	0.860	0.866	0.899	0.839	0.934
LM *p*-value	0.006	0.760	0.189	0.029	0.699	0.008	0.625
BP *p*-value	0.983	0.000	0.949	0.612	0.458	0.562	0.384
JB *p*-value	0.448	0.770	0.613	0.817	0.511	0.758	0.823
Observations	37	38	37	37	37	37	37

Note: panel A reports long-run results from estimating the ARDL with private savings as dependent variable, with column (1) representing the baseline model. Standard errors are reported in parentheses (***p≤0.01, **p≤0.05, *p≤0.1). ToT is the terms of trade index. Panel B reports the diagnostic tests for the various models from columns (1) to (7) (see Cameron and Trivedi 2010 for details). LM *p*-value is for the Breusch-Godfrey LM test for autocorrelation (null hypothesis is no serial correlation), BP *p*-value is for the Breusch-Pagan/Cook-Weisberg test for heteroskedasticity (null hypothesis is homoskedasticity), and JB *p*-value is for the Jarque-Bera normality test (null hypothesis of normality).

Source: authors' construction.

Panel A of Table 5 shows that the main determinants of gross savings are GDP per capita, domestic credit to the private sector, terms of trade, and inflation (column 1). GDP per capita is positive and significant, consistent with the literature which suggests that higher output per capita is associated with higher savings through increases in production and productivity, which ultimately increase disposable incomes (Athukorala and Sen 2004; Were and Joseph 2022). In

addition, for countries with comparatively lower income levels, a small increase in economic expansion is associated with a higher marginal propensity to save, boosting gross savings (i.e. both private and public savings) in the country. Domestic credit to the private sector has a positive relationship with gross savings. While standard models of saving behaviour postulate a precautionary saving motive by which total savings fall when access to credit improves, the positive relationship here suggests that individuals or businesses will find it safer to keep their financial assets in financial institutions and still have access to credit. It may also be the case that excess credit contributes to an expansion of the economy, which then encourages both consumption and saving.

We find a strong negative relationship between gross savings and the terms of trade index, suggesting that adverse shocks to commodity prices, i.e. a terms of trade deterioration, are associated with attempts to smooth consumption in the face of such shocks, hence increased gross savings (similar to the results above with private savings). This finding is unsurprising given Cameroon's strong dependence on primary commodity exports, the prices of which are susceptible to unpredictable changes (see Section 2.1). In the long run higher inflation is associated with higher domestic savings. While higher inflation increases the opportunity cost of holding liquid assets in comparison with spending, it also creates uncertainty about future income streams, which incentivizes an increase in (precautionary or pre-emptive) savings.

Measures of institutions were introduced analogously to the model with private savings (Table 6). The ICRG and WGI variables are all insignificant, while the V-Dem variables (political corruption and rule of law) are significant. The political corruption index has a strong negative impact on gross savings, which may result from increased costs of doing business and limited access to financial resources and markets. Swaleheen (2008) shows that corruption adversely affects savings by encouraging capital flight. Freytag and Voll (2013) show that better economic institutions (but not necessarily better political institutions) increase private savings. Facchini et al. (2024) show that, while institutions themselves do not impact private savings, trust in political institutions—specifically institutions at the higher level (politicians) and institutions responsible for passing laws (parliament)—is a significant driver of private savings in OECD countries. As the political corruption index measures different types of corruption ranging from petty to grand corruption, bribery, and theft as well as to corruption aimed at influencing lawmaking and policy, the specific effect which drives the negative effect on savings is difficult to decipher. The rule of law index has a positive relationship with gross savings, meaning that strong enforcement of credit contracts has a strong effect on gross savings, potentially through increased bank credit (hence more loans) and reduced costs of financial intermediation.

Table 6: Long-run analysis of gross savings, institutions

	Panel A: Long-run coefficients		
	(1)	(2)	(3)
Log GDP per capita	4.530	7.889**	11.936***
	(3.511)	(2.782)	(3.306)
Domestic credit	0.181*	-0.028	-0.453***
	(0.092)	(0.095)	(0.153)
ToT	-0.143***	-0.072	-0.055
	(0.045)	(0.044)	(0.048)
GDP growth	0.342**	0.372***	0.494***
	(0.151)	(0.117)	(0.138)
Inflation	0.277**	0.281***	0.276***
	(0.109)	(0.073)	(0.069)
Bureaucratic quality	0.556		
	(0.971)		
Rule of law index		0.564**	
		(0.274)	
Political corruption index			-0.607***
			(0.151)
Adjustment term	-0.748***	-0.770***	-0.762***
	(0.157)	(0.098)	(0.088)
	Panel B: Diagnostic tests		
R-squared	0.866	0.908	0.910
LM *p*-value	0.241	0.444	0.297
BP *p*-value	0.723	0.207	0.629
JB *p*-value	0.883	0.676	0.831
Observations	33	35	37

Note: panel A reports long-run results from estimating the ARDL with private savings as dependent variable, with column (1) representing the baseline model. Standard errors are reported in parentheses (***p≤0.01, **p≤0.05, *p≤0.1). SPB is the public savings ratio and ToT is the terms of trade index. Panel B reports the diagnostic tests for the various models from columns (1) to (7) (see Cameron and Trivedi 2010 for details). LM *p*-value is for the Breusch-Godfrey LM test for autocorrelation (null hypothesis is no serial correlation), BP *p*-value is for the Breusch-Pagan/Cook-Weisberg test for heteroskedasticity (null hypothesis is homoskedasticity), and JB *p*-value is for the Jarque-Bera normality test (null hypothesis of normality).

Source: authors' construction.

The short-run effects mirror those from the private savings model, with terms of trade mostly displaying significant negative effects (see Appendix Table A3).

5.2 Additional control variables

Other economic variables are included to ascertain: (i) their direct impacts on savings; and (ii) the robustness of the primary variables to the inclusion of these additional controls. The additional variables include broad money (% GDP), urban population (%), private consumption (% GDP), net FDI inflows (% GDP), external debt stock (% GNI) and personal remittances received (% GDP). All these variables are obtained from the WDI database covering the period from 1980 to 2018.

Columns (2) to (7) of Table 3 show the results for additional determinants of private savings. Broad money has a positive relationship with private savings, consistent with the idea that increased availability of currency outside banks means that more money circulates in the economy, increasing individuals' disposable income and their marginal propensity to save (hence increasing private savings). The relationship between private consumption and private savings is straightforward: increases in household consumption reduce disposable income that can otherwise

be saved, resulting in reduced private savings rates. The external debt stock has a negative relationship with private savings. This is unsurprising given that most of the financial resources available in the country (government revenue and foreign exchange) are used to pay down debt and service the debt, resulting in lower savings. Population growth, urban population, and remittances are insignificant.

5.3 Robustness analysis

Crisis variables

We introduce dummy variables to ascertain the robustness of our results to the following global and country-specific events: the oil price hike of the late 1970s to early 1980s, the devaluation of the CFA franc in 1994, the effects of the global financial crisis, and the introduction of mobile money (digital finance) in 2012. Table 7 reports the findings for private savings while Table 8 reports the findings for gross savings.

Table 7: Long-run analysis for private savings, crisis variables

	Panel A: Long-run analysis				
	(1)	(2)	(4)	(5)	(6)
SPB	-1.176***	-1.015***	-0.646	-1.390**	-1.412***
	(0.225)	(0.172)	(0.399)	(0.607)	(0.128)
Log GDP per capita	2.166	1.892	0.807	-1.032	3.015
	(2.558)	(2.215)	(4.541)	(6.289)	(2.966)
Domestic credit	0.119*	0.072	0.099	0.340**	0.276***
	(0.067)	(0.052)	(0.110)	(0.161)	(0.094)
ToT	-0.097**	-0.109***	-0.081	-0.036	-0.082
	(0.042)	(0.036)	(0.075)	(0.111)	(0.057)
GDP growth	0.153	0.061	-0.060	0.452	0.472**
	(0.154)	(0.127)	(0.308)	(0.306)	(0.191)
Inflation	0.278***	0.251***	0.380***	0.100	0.369***
	(0.063)	(0.054)	(0.115)	(0.159)	(0.084)
Oil price dummy	4.067*	11.208			
	(2.060)	(7.088)			
ToT*oil price dummy		-0.106			
		(0.104)			
Financial crisis dummy			-2.903		
			(2.982)		
Devaluation dummy				9.023	
				(5.432)	
Mobile money dummy					-1.660
					(1.451)
Adjustment term	-0.749***	-0.863***	-0.512**	-0.330**	-0.608***
	(0.115)	(0.095)	(0.190)	(0.137)	(0.128)
	Panel B: Diagnostic tests				
R-squared	0.871	0.861	0.867	0.875	0.876
LM *p*-value	0.289	0.467	0.867	0.808	0.750
BP *p*-value	0.537	0.167	0.179	0.246	0.219
JB *p*-value	0.834	0.743	0.424	0.968	0.831
Observations	35	36	36	35	35

Source: authors' construction.

First, we incorporate the sustained oil price hike in the early 1980s. Given that oil was the main source of export revenue (hence domestic revenue) in the 1980s, we ascertain whether the constant high price between 1980 and 1986 had an impact on savings aggregates. We create a dummy

variable which equals one for the periods of elevated oil prices, i.e. from 1980 to 1986, and zero otherwise. We find a strong positive relationship between the dummy variable and private savings. To explore heterogeneity further, we interact the oil price dummy variables with: (i) the terms of trade index; and (ii) the public savings ratio. The intuition is that, as fluctuations in commodity prices work mostly through the terms of trade, the interaction term can capture the specific effect of the oil price increase on savings through its impact on the country's terms of trade. Furthermore, fluctuations in oil prices ultimately result in fluctuating government revenues, hence volatile public savings ratios. Thus, an interaction term between the oil price dummy and the public savings ratio can capture the effect of an oil price increase on savings through the public savings ratio. For terms of trade neither the interaction term nor the oil price dummy is now significant. For the public savings ratio the interaction term is insignificant while the oil price dummy is positive and significant.

Table 8: Long-run analysis for gross savings, crisis variables

	Panel A: Long-run analysis				
	(1)	(2)	(3)	(4)	(5)
Log GDP per capita	-3.456	-2.390	-1.549	-0.976	-0.969
	(2.866)	(2.810)	(2.412)	(2.166)	(2.530)
Domestic credit	-0.027	-0.021	0.239***	0.222***	0.237***
	(0.069)	(0.067)	(0.037)	(0.049)	(0.038)
ToT	-0.007	-0.027	-0.061	-0.059*	-0.064
	(0.041)	(0.041)	(0.036)	(0.033)	(0.038)
GDP growth	-0.362**	-0.273*	0.245***	0.208**	0.269***
	(0.151)	(0.152)	(0.086)	(0.084)	(0.091)
Inflation	0.253***	0.255***	0.273***	0.353***	0.272***
	(0.083)	(0.081)	(0.054)	(0.090)	(0.056)
Oil price	7.627***	-3.960			
	(2.230)	(6.892)			
ToT*oil price		0.166*			
		(0.096)			
Financial crisis			0.163		
			(1.011)		
Devaluation				0.310	
				(2.485)	
Mobile money					-0.432
					(0.887)
Adjustment term	-0.696***	-0.689***	-0.826***	-0.869***	-0.829***
	(0.124)	(0.119)	(0.109)	(0.115)	(0.121)
	Panel B: Diagnostic tests				
R-squared	0.760	0.937	0.874	0.894	0.855
LM *p*-value	0.664	0.425	0.100	0.007	0.061
BP *p*-value	0.189	0.899	0.905	0.517	0.828
JB *p*-value	0.797	0.695	0.496	0.904	0.681
Observations	38	37	37	37	37

Source: authors' construction.

Second, we attempt to ascertain the impact of the 1994 devaluation of the CFA franc. As argued in Section 2.1 the devaluation was associated with strong competitiveness in domestic industries which culminated in increased growth. We create a dummy variable which takes the value of one in the year of the devaluation and zero otherwise. The dummy variable is positive but insignificant. Third, we incorporate the impact of the global financial crisis between 2008 and 2009. We create a dummy variable which equals one for the years 2008 and 2009 and zero otherwise. While we find

the dummy variable to be negative, suggesting that the financial crisis may have been unsurprisingly associated with lower private savings, the dummy variable is insignificant.

Fourth, we try to isolate the impact of the introduction and usage of digital finance, i.e. mobile money. We create a dummy variable which equals one from the year of introduction to the final year of the sample, i.e. from 2012 to 2018, and zero otherwise. We find the variable to be negative and insignificant. While we cannot discuss this insignificant result in detail, the negative effect may not be surprising as digital money mostly facilitates financial intermediation and is used primarily to cover other services (e.g. payment of bills) rather than as a means of savings.

We carry out similar analysis of crisis variables on gross savings and summarize the results below (findings reported in Table 8). First, the oil price dummy variable is strongly significant, suggesting that the period of elevated oil prices which contributed to significant government revenues also had a positive impact on gross savings through higher public savings. For the model with an interaction term, the dummy variable for oil prices is insignificant while the interaction term is significant.[16] The coefficient on the interaction term captures the difference in the terms of trade and gross savings relationship between the years when oil prices were very high (i.e. between 1980 and 1986) and when they were not, and it shows that the difference is strongly significant. Second, all the other dummy variables, i.e. devaluation, global financial crisis, and mobile money, are insignificant.

6 Conclusion

Domestic resource mobilization (DRM) has been reiterated as a fundamental tenet in the post-COVID recovery across developing countries. While much of the DRM discussion has aptly focused on expanding tax revenue mobilization, less is known about the potential galvanizing impact of domestic savings on the DRM process. For this, it is important to understand the factors that cause savings rates to differ across countries (and possibly regions) and over time. This paper filled that gap by estimating the determinants of savings rates, both private and gross, in Cameroon over the period from 1980 to 2018. Applying the ARDL method to distinguish between long-run and short-run effects, we found that our empirical analysis matched predictions from the lifecycle model of savings: the findings showed that income growth is a core determinant of savings.

Two key findings are highlighted. First, we found strong similarities between the determinants of private and gross savings (e.g., economic growth, domestic credit to private sector, terms of trade, and inflation influence both savings aggregates). We showed that the terms of trade index has a positive relationship with gross savings, indicating that adverse shocks to commodity prices are associated with increased savings through agents' attempts to smooth consumption in the face of such shocks. We showed that public savings erode private savings, which is unsurprising given the dampening effects that persistent fiscal deficits ultimately have on economic outcomes. Second, we sought to isolate the impact of various global and country-specific shocks and policy reforms, specifically the sustained oil price increases in the 1980s, the 1994 devaluation of the CFA franc, the 2008–09 global financial crisis, and the introduction (and continued usage) of mobile money from 2012. With the exception of the oil price dummy variable, which is occasionally significant, all other dummy variables are consistently insignificant.

[16] As public savings ratios cannot be included as a determinant of gross savings, the interaction term results reported here are entirely for the interaction between the oil price dummy variable and the terms of trade index.

While these findings are highly context-specific, hence not generalizable, some policy implications can be gleaned from them. The obvious starting point will be to incorporate specific (quantitative) targets for private and gross savings into national development plans and DRM strategies. This will ensure that targets are grounded in sound economic analysis and that targeted policies to improve domestic savings are not arbitrary but are enshrined in legislation, which lends them more credibility. Furthermore, policies that encourage financial inclusion and deepening should be fostered.

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Appendix A: Additional results

Table A1: Bounds cointegrating test

	Private savings model		Gross savings model	
	Value	K	Value	K
t-statistic	-5.125	6	-7.257	5
	Critical value bounds			
Significance	I(0) bound	I(1) bound	I(0) bound	I(1) bound
10%	-2.57	-4.04	-2.57	-3.86
5%	-2.86	-4.38	-2.86	-4.19
2.5%	-3.13	-4.66	-3.13	-4.46
1%	-3.43	-4.99	-3.43	-4.79

Note: results from the Pesaran et al. (2001) bounds test are reported for baseline models from Tables 3 and 4. The null hypothesis is for no long-run relationship (i.e. no cointegration) between the dependent variables and their respective determinants. The decision rule is to reject the null hypothesis if the t-statistic is less than the critical value for I(1) regressors.

Source: authors' construction.

Table A2: Short-run model for private savings

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
L.ΔPrivate savings	-0.267** (0.112)	-0.284** (0.124)	-0.220* (0.108)	-0.223* (0.111)	0.121** (0.049)	-0.264** (0.117)	-0.305*** (0.090)
ΔToT	0.097*** (0.028)	0.137*** (0.025)	0.098*** (0.031)	0.076** (0.030)		0.096*** (0.031)	0.110*** (0.023)
L1. ΔToT	-0.045* (0.025)			-0.055** (0.025)		-0.045* (0.026)	-0.043** (0.020)
ΔInflation	-0.102*** (0.035)	-0.120*** (0.037)	-0.124*** (0.033)	-0.089** (0.035)	-0.065*** (0.015)	-0.102** (0.036)	0.100*** (0.028)
ΔDomestic credit			-0.078 (0.089)				
L1.ΔDomestic credit			-0.225** (0.106)				
L.ΔPublic savings					-0.343*** (0.114)		
ΔGrowth					0.017 (0.036)		
L.ΔGrowth					-0.080** (0.032)		
ΔHousehold consumption					-0.499*** (0.139)		

Note: diagnostic tests same as from Table 3 (unreported).

Source: authors' construction.

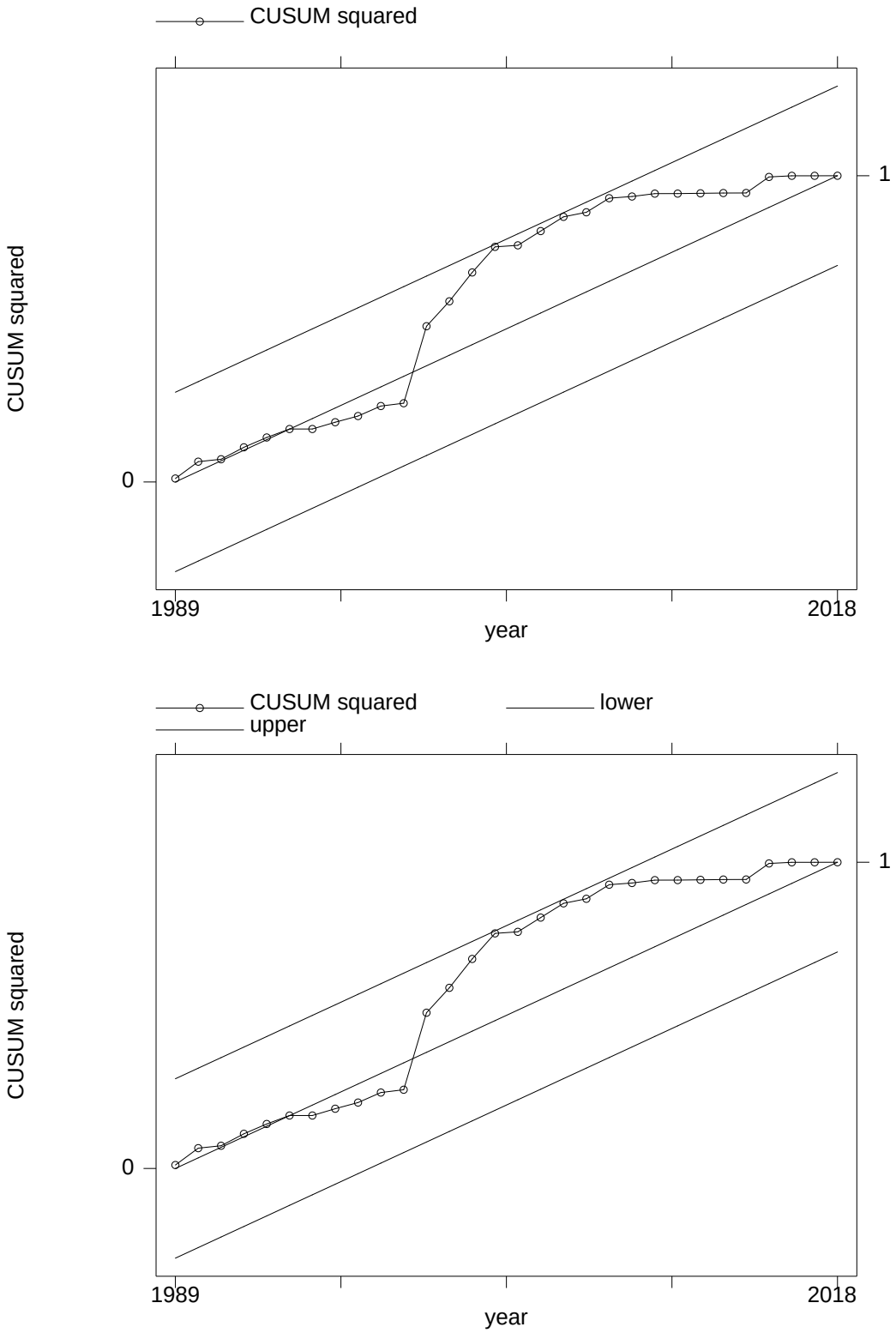
Table A3: Short-run model for gross savings

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
L.ΔGross savings					0.444***		
					(0.149)		
Δ Log GDP per capita							-9.619***
							(2.820)
L. Δ Log GDP per capita							-5.439*
							(2.796)
ΔToT	0.090***	0.139***	0.093***	0.048		0.110***	0.165***
	(0.032)	(0.035)	(0.030)	(0.033)		(0.036)	(0.021)
L1. ΔToT	-0.059*	-0.077**		-0.076**		-0.055*	
	(0.029)	(0.028)		(0.028)		(0.029)	
ΔInflation	-0.140***	-0.135***	-0.124***	-0.104**		-0.152***	-0.236***
	(0.042)	(0.039)	(0.033)	(0.041)		(0.044)	(0.047)
ΔDebt							-0.091**
							(0.033)
L1.ΔDebt							-0.090**
							(0.038)
ΔHousehold consumption					-0.049		
					(0.239)		
L.ΔHousehold consumption					0.795***		
					(0.211)		

Note: diagnostic tests same as from Table 3 (unreported).

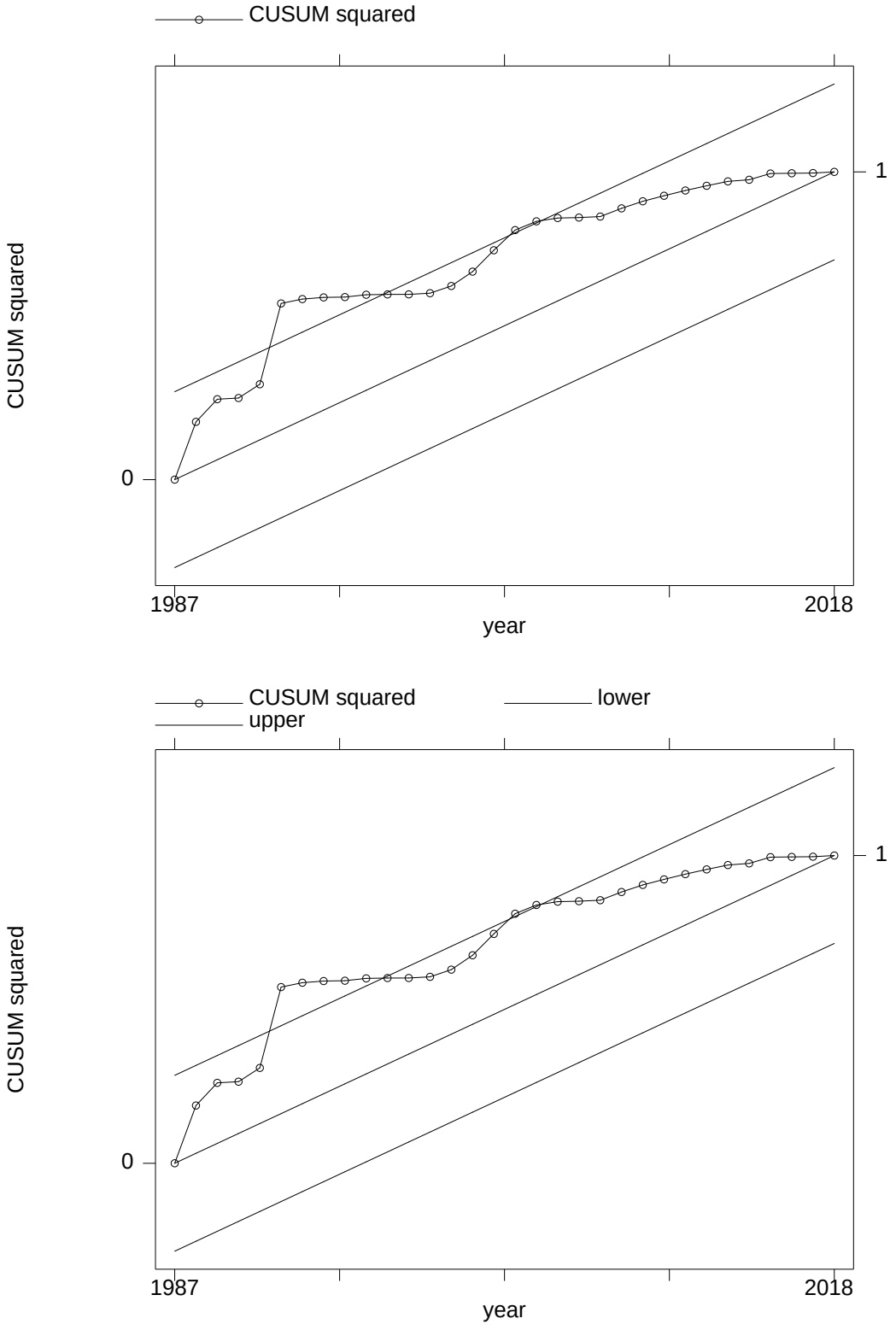
Source: authors' construction.

Figure A1: Private savings model stability test



Source: authors' construction.

Figure A2: Gross savings model stability test



Source: authors' construction.