




# Funding sources, colonial legacy, and new firms' creation in Africa

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## Abstract

This study examines the determinants of new firm creation in Africa, focusing on external and internal funding sources and their interactions. It also explores the influence of colonial history by separately analyzing former British and French colonies. The primary goal is to help fill crucial gaps in African literature on the determinants of entrepreneurship. Given Africa's widespread poverty and underdevelopment, understanding what drives entrepreneurship is essential for job creation and economic growth. The study reveals three key findings. First, at the full sample level, remittances are the only external financing source positively associated with new firm creation, while foreign aid and foreign direct investment obstacle it. Internal sources, like savings and credit, do not show significant effects. Second, the subsample analysis reveals heterogeneous results: former British colonies' funding sources align with the overall findings, while in former French colonies, only savings support entrepreneurship. Third, considering control variables, the subsample analysis indicates two distinct entrepreneurship models: opportunity-based in former British colonies and necessity-based in former French colonies. These findings are noteworthy and provide significant policy implications at both national and international levels. Crucially, the positive role of remittances in financing new business initiatives, confirms that migration serves as a mutually beneficial arrangement for both sending African countries and the host countries.

**Keywords** Africa · New firms · Colonial legacy · Remittances · Foreign aid · Foreign direct investment · Savings · Credit

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## 1 Introduction

In this study, we empirically analyze the determinants of entrepreneurship in Africa. This continent, which has seen limited empirical investigation regarding entrepreneurship determinants, represents an intriguing case study for several reasons. Over the past 70 years, per capita GDP in Africa has exhibited growth rates significantly below those of OECD countries and the global average. More recently, in the period 2006–2021 covered by our analysis, this gap enlarged with Africa growing on average at a rate of 0.88%, while the world average was 1.58%, and the OECD average of 0.94%. Thus, while some countries seem to be emerging from decades of disappointing growth (Ndikumana and Blankson 2015), Africa as a whole remains trapped in poverty and underdevelopment, with significant disparities persisting.

Therefore, it is paramount to understand how to stimulate growth and highlight the mechanisms underlying such striking differences. The private-sector-led growth mechanism is widely deliberated in scholarly discourse, particularly within developing economies (Vaaler 2011). This framework posits that the establishment of new enterprises propels sustainable economic advancement. These entities not only generate employment opportunities but also serve as catalysts for income augmentation, innovation, and the accumulation of human capital. Moreover, the emergence of new ventures fosters a competitive environment, compelling existing firms to enhance their efficiency and adaptability. This dynamic accelerates structural transformations within the economic landscape, further fueling growth and development (Omoruyi et al. 2017). Haltiwanger (2015) highlighted that new firms create more employment than larger incumbent firms, which spurs policymakers to design policy incentives to encourage entrepreneurship (Ratinho et al. 2020). From this perspective, it is interesting to observe that the rates of new firm creation differ across African regions significantly (Ajide and Osinubi 2022) and that such differences could help explain the wide divergences in regional economic performance (Raja et al. 2014).

Several aspects of African history may have influenced its entrepreneurial development. Among these, the colonial past may have played an important role. The effect of colonial legacy on growth and development is a widely discussed issue in the literature with two opposing points of view (Acemoglu et al. 2001): the "drain of wealth" thesis emphasizes the negative effects of colonization, while the "modernization" thesis highlights the positive impulses that colonies received from their colonizers (Bertocchi and Canova 2002).

However, despite its relevance, the issue of colonization in Africa has received little attention in the economic literature. Prominent exceptions include research by Grier (1999), Bertocchi and Canova (2002), and de Sousa and Lochard (2012), which underscore superior economic growth and trade performance among former British colonies compared to French counterparts. This comparative analysis has captured scholars' attention, as following World War I, France and Great Britain, the two principal European colonial powers, held sway over approximately four-fifths of the African continent (de Sousa and Lochard 2012). Considering the findings from previous studies, it

is reasonable to believe that the colonial legacy of former British and French colonies may have also influenced the entrepreneurial development of African countries. The main idea is that British colonization might have been the origin of better institutions that enforced the rule of law, encouraging investment and the creation of new firms. According to de Sousa and Lochard (2012), systematic institutional differences exist between the British and French colonial systems. British common law offers stronger legal protection and a lower level of corruption, which creates a more favorable environment for the creation of new firms (Urbano et al. 2019; Ajide and Osinubi 2022).

Another crucial question when addressing the determinants of entrepreneurship in Africa concerns the differentiated role of the various financing sources needed for founding new business ventures. Unfortunately, many African countries are low-income and need more capital to create new firms. Therefore, it is of the utmost importance to establish which one of the various financing sources available to the countries is more likely to induce new firms' creation and, consequently, more employment, higher economic growth, and, in the end, also better living standards. To our knowledge, this is an almost neglected topic in the literature.

Considering these literature gaps, this paper aims to contribute to the discussion on African entrepreneurship by concurrently examining the influence of colonial history and diverse funding sources. In more detail, this investigation addresses the following research questions: Does the source of finance matter for the creation of new firms? Do the sources of financing behave as substitutes or complements? Does colonization explain differences in entrepreneurship development across African countries?

To answer these research questions, we empirically estimate a model of entrepreneurship determinants for a panel of 36 African countries from 2006 to 2021, where entrepreneurship is measured in terms of new firms' birth. In particular, the analysis aims to determine whether and to what extent different sources of financing affect the creation of new firms. We compare the impact of three external (remittances, foreign aid, and foreign direct investment) and two internal (domestic credit and gross domestic savings) sources of financing. Furthermore, we also investigate if and how the various financing sources interact with each other in the birth of new firms by analyzing their intertwined effects.

The empirical analysis begins by focusing on the full sample. Then, it moves to a subsample level where two groups of countries are identified according to their past as former British or French colonies. The comparison of the results of the subsamples allows us to highlight whether and to what extent the colonial legacy has influenced the entrepreneurial development of African countries. Our findings suggest that not all funding sources act as a push factor for new businesses. Remittances prove to be the most effective and stable source. The results also show that the colonial past of the African continent has certainly conditioned its entrepreneurial development.

The rest of the paper is organized as follows. Section 2 provides a review of the relevant literature. Section 3 describes the data, methodology, and empirical approach. Section 4 discusses the results. Section 5 concludes with a summary of the main findings and a discussion of the policy implications and limitations of this study.

## 2 Literature review

This section does not aim to provide an exhaustive review of the large literature on entrepreneurship determinants. Instead, the focus is on the role played by external (remittances, foreign aid, and foreign direct investment) and internal (credit and savings) sources of financing new business starts, highlighting, when possible, specific evidence regarding African countries. The discussion first focuses on the mechanisms linking each funding source to entrepreneurship (SubSects. 2.1 and 2.2). Then, the analysis moves to empirical evidence that compares the different sources of financing (SubSect. 2.3).

### 2.1 The mechanisms linking external financing sources with entrepreneurship

There is a widely held view that capital inflows in the form of financial remittances, foreign aid, and foreign direct investment can positively impact entrepreneurship, especially in developing countries. However, both theoretical and empirical perspectives suggest that opposing mechanisms are plausible.

Concerning financial remittances, substantial literature supports the idea that these resources can finance entrepreneurial activities, easing credit and liquidity constraints and thus helping the private sector to drive development (cf. Vaaler 2011; Laniran and Olakunle 2019; Ajide and Osinubi 2022). Compared to other financing sources, financial remittances provide stable resource inflows with a substantial social component (Bettin et al. 2024). Migrants, along with money, transfer ideas that can stimulate their families to create new businesses in their country of origin. These intangible assets, referred to as "social remittances" by Levitt (1998), have the potential to stimulate new entrepreneurial ventures in the country of origin and enhance the impact of financial remittances (Bettin et al. 2024).

Contrary to this view, a substantial body of research argues that the link between remittances and entrepreneurship is weak, as this type of resource is primarily aimed at supporting consumption, improving health, and increasing educational levels. Some authors also contend that when remittances finance entrepreneurship, it is often out of necessity rather than to exploit an opportunity (Zheng and Musteen 2018). Empirically, the relationship between remittances and new businesses has been tested at both single- and multiple-country levels without unanimous conclusions (Bettin et al. 2024). While single-country studies show mixed evidence, a positive impact of remittances prevails at a cross-country level. These studies use different measures of entrepreneurship, diverse model specifications, and various estimation techniques, which are likely reasons why the results have yet to converge.

Regarding the impact of foreign direct investment (FDI) on entrepreneurship, a large body of research shows that the relationship can go in opposite directions, highlighting the so-called "blessing or curse" issue (Zhao 2022). Theoretically, the "blessing" mechanism, which assumes a positive relationship, is based on the idea that the diffusion of knowledge and technology from foreign enterprises to receiving

countries can inspire new businesses or help grow existing ones (Danakol et al. 2017; Zhao 2022). Several mechanisms can explain this positive relationship, such as labor mobility (when workers move from multinational enterprises to domestic firms, they bring knowledge and experience), intra-industry spillover effects through "learning by watching" (local private firms learn how to improve productivity by observing foreign companies), and inter-industry spillover effects (foreign enterprises create incentives for local firms). In contrast, the "curse" mechanism highlights the negative link, which might prevail if FDI is channeled towards rent-seeking activities, leading to a "crowding-out" or "market-stealing" effect (Danakol et al. 2017; Zhao 2022). This may happen not only because foreign firms attract capital and labor but also because they typically adopt superior technologies that increase competitive pressure, raising barriers to entry or causing domestic firms to exit the market. Slesman et al. (2021) argue that the negative effect might be emphasized in countries with low-quality institutions. Their empirical results confirm the possibility that opposite effects might manifest.

Studies on foreign aid (AID) and entrepreneurship are less extensive than those on other external sources. However, the literature in this field also highlights two contrasting effects. On the one hand, AID can help receiving countries relax poverty constraints, boost physical, human, and social capital accumulation, increase income and savings, and thus empower individuals through entrepreneurship (Chenery and Strout 1966). On the other hand, AID can create disincentives for business development due to aid misuse, corruption accompanying its administration, and the common practice of tying aid to specific projects in recipient countries (Easterly 2001). Ovaska and Takashima (2020) state that these diverging outcomes depend on the institutional quality of the recipient countries. Moore et al. (2020) support this statement, while Jia (2018) finds that AID has mixed effects on different types of entrepreneurship. Empirical literature in this field is still very scant and does not help to unravel its contrasting effects.

## 2.2 The mechanisms linking internal financing sources with entrepreneurship

Internal sources such as private savings and bank credit also play an important role in entrepreneurship financing.

Regarding savings, the link to entrepreneurship originates from extensive economic literature, which traditionally recognizes the fundamental role of savings in growth and development. Under this general theoretical umbrella, savings can be seen "as a gateway to the business world" (Daher et al. 2022, p.47). Private savings are usually unaffected by the complications of dealing with banks and are, therefore, the simplest financial source for starting new businesses, especially small businesses. As a result, good saving habits can enhance the individual entrepreneurial mindset (Rikwentshe et al. 2015) and intention (Amofah et al. 2020). Furthermore, saving, by allowing people to enter the financial system, helps to increase financial literacy, which, in turn, leads to an increase in individual saving (Kantis et al. 2002) and entrepreneurship (Rikwentshe et al. 2015).

Of course, the link between savings and entrepreneurship goes beyond the direct channel of self-financing. Savings are also a fundamental source for fueling financial intermediation and, therefore, the credit channel, which allows available resources to meet the needs of investors. This possibility depends on the special role played by financial intermediaries in supporting investment, such as maturity transformation and risk mitigation (Levine 1997; Ndikumana and Blankson 2015). Therefore, when personal resources are scarce, the availability of bank credit for the private sector becomes an essential condition for financing new businesses. Conversely, an underdeveloped financial system and obstacles to accessing bank credit can discourage entrepreneurship, especially in developing countries (Yavuz and Bahadir 2022).

### 2.3 Empirical evidence comparing different funding sources

After highlighting the mechanisms connecting internal and external financing sources to entrepreneurship, several pertinent questions still need to be answered. Firstly, some sources may yield contrasting effects. Secondly, the mechanisms governing the relationship between each source and entrepreneurship may operate differently when multiple funding sources are involved simultaneously. However, there is a paucity of empirical literature addressing this latter issue, hindering the identification of unequivocal answers. In fact, within the vast literature on the role of remittances in entrepreneurship, only a relatively small number of empirical studies examine the role of various financing sources within a unified framework. Table 1 summarizes the main characteristics of the selected papers and the primary empirical evidence they report: Panel (a) highlights empirical studies that consider only external sources of financing, whereas Panel (b) shows works that include both external and internal sources.

Four contributions reported in Panel (a) consider both remittances and FDI. The first is Vaaler (2011), considered a pioneer in this field of research. He analyzes 61 non-OECD and other developing countries between 2002 and 2007. Vaaler finds that remittances affect new firm creation only when they interact with the state share of the economy (measured by the share of GDP accounted for by the government and state-owned enterprises). Remittances effectively influence the decision to open new businesses only at low levels of the state share of the economy. In his model, the author considers FDI among the control variables and estimates a positive impact of FDI on new business creation. Following Vaaler (2011), Martinez et al. (2015) examine the relationship between remittances and new firm starts for a panel of 48 developing countries from 2001 to 2009, focusing on the role of informality. They estimate a negative coefficient for remittances and find that the level of informality moderates the impact of this variable. In their analysis, the variable of FDI, among the controls, does not impact business starts. Similarly, Hanusch and Vaaler (2015) consider a sample of 47 developing countries for the period 2002–2007 to study the role of remittances for different levels of internal capital access. They find that remittances increase new firm births, but their effect diminishes as capital access increases. FDI reports a positive sign. Finally, Nanyiti and Sseruyange (2022) consider 63 countries for the years 1981–2011 and analyze the effect of remittances

on firm density and self-employment. At the full sample level, their results show that remittances stimulate entrepreneurship. However, this effect is only confirmed for low-income countries at the subsample level. FDI inflows show a statistically significant coefficient with a negative sign only for the case of self-employment in high-income countries.

The list of works in Panel (a) continues with three contributions where the role of the three external sources is tested simultaneously. The first study is proposed by Cummings and Gamlen (2019), where the impact of remittances on entrepreneurship is investigated for a sample of 35 developing or emerging countries observed from 2001 to 2010. Diaspora engagement is the moderating term. The authors find that remittances positively affect new firm creation and that diaspora engagement institutions magnify the effect of remittances on new firm creation. The variables AID and FDI are among the controls, but they never report statistically significant estimated coefficients.

The second study, by Ajide and Osinubi (2022), concerns the role of international aid in new firms' density for a sample of 19 African countries from 2006 to 2017. They find that AID and remittances harm new firms' density. However, interestingly, they show that remittances can mitigate the negative impact of foreign aid on entrepreneurship, indicating complementarity between the two variables. They also find that institutional quality mediates the negative effects of foreign aid on entrepreneurial progress. These authors also include FDI as a control variable, which never displays a statistically significant estimated coefficient.

These results partially compare with the findings of Asongu et al. (2019) regarding the negative impact of remittances in African countries, estimated on measures of doing business other than new firms' creation. In their work, they also find opposite signs for the effect of AID and FDI depending on the measure of entrepreneurship.

Moving on to Panel (b) of Table 1, we first find the contribution of Yavuz and Bahadir (2022), where the attention shifts to ethnic diversity and its interaction with remittances in new business creation for a panel of 64 developing countries from 2006 to 2016. They find that remittances positively affect new business creation and that ethnic diversity boosts this positive effect. Among the determinants, FDI inflows do not influence new businesses, while private credit seems to impact new firms positively.

By extending the perspective beyond developing countries, Bettin et al. (2024) study a large panel of 143 countries from 2006 to 2018 and investigate the role of social and financial remittances and their interaction on new firm creation. They find that both types of remittances are positively and significantly correlated with new firm creation and that the effect of financial remittances depends on the level of social remittances. Once social remittances exceed a threshold level, financial remittances do not contribute to creating new firms. Among the determinants, the variable FDI does not show any influence on new businesses. The credit variable is among the additional controls and reports a positive estimated coefficient.

Piras (2023) examines 78 countries from 2006 to 2020 and investigates the role of remittances and economic complexity on new firms' birth. He finds that the impact of remittances is inversely mediated by economic complexity. He also finds

Table 1 Literature

Author(s)	Dependent variable	Main independent variable(s)	Moderating variables	Countries	Period	Estimation methods	Main Findings
<i>Panel (a). External sources</i>							
Vaaler (2011)	NLLC	REM FDI	State share of the economy	61 non-OECD and other developing countries	2002–2007	NB	Positive effect of remittances only at low level of the state share of the economy. Positive effects of FDI
Martinez et al. (2015)	NLLC	REM FDI	Informality	48 developing countries	2001–2009	NB	Negative effect of REM, which declines as informality increases. No effect of FDI
Hanusch and Vaaler (2015)	NLLC	REM FDI	Access to capital	47 developing countries	2002–2007	NB, GMM	Positive effect of REM, which diminishes as capital access increases. Positive effects of FDI



Table 1 (continued)

Author(s)	Dependent variable	Main independent variable(s)	Moderating variables	Countries	Period	Estimation methods	Main Findings
Nanyiti and Sseruyange (2022)	Firms' density Self-employment	REM FDI		63 countries	1981–2011	GMM	Positive effect of REM for the full sample and for the low-income sub-sample. FDI show a statistically significant coefficient with a negative sign only for self-employment in high-income countries
Cummings and Gamlen (2019)	NLLC	REM FDI AID	Diaspora engagement	35 countries developing or emerging	2001–2010	NB	Positive effect of REM which increases with diaspora engagement. No effect of FDI. No effect of AID

Table 1 (continued)

Author(s)	Dependent variable	Main independent variable(s)	Moderating variables	Countries	Period	Estimation methods	Main Findings
Ajide and Osinubi (2022)	New firms' density	REM FDI AID	Institutional quality	19 African countries	2006–2017	GLS, 2SLS/IV, PCSE	Negative effect of REM. Negative effect of AID. REM mitigate the negative effect of AID. Institutional quality mitigates the negative effect of AID. No effect of FDI
Asongu et al. (2019)	Measures of doing business	REM FDI AID	Mobile phone subscriptions/ Internet penetration	49 Sub-Saharan African countries	2000–2012	GMM	Negative effect of REM depending on measure of entrepreneurship. Opposite effects of AID and FDI depending on the measure of entrepreneurship

Panel (b). External with internal sources

**Table 1** (continued)

Author(s)	Dependent variable	Main independent variable(s)	Moderating variables	Countries	Period	Estimation methods	Main Findings
Yavuz and Bahadır (2022)	NLLC	REM FDI CREDIT	Ethnic diversity	64 developing countries	2006–2016	NB, IV	Positive effect of REM which increases with ethnic diversity. No effect of FDI Positive effect of CREDIT
Bettin et al. (2024)	NLLC	REM FDI	Social remittances	143 countries	2006–2018	NB	Positive effect of REM, which diminishes as social remittances increase. No effect of FDI. Positive effect of CREDIT

Table 1 (continued)

Author(s)	Dependent variable	Main independent variable(s)	Moderating variables	Countries	Period	Estimation methods	Main Findings
Piras (2023)	NLLC	REM FDI CREDIT	Economic complexity	78 countries	2006–2020	NB	Positive effect of REM inversely mediated by economic complexity, but with differences between sub-samples. The average marginal effect is negative in Africa. CREDIT and FDI produce different effects depending on sub-samples. Concerning Africa, both variables display a negative sign

Table 1 (continued)

Author(s)	Dependent variable	Main independent variable(s)	Moderating variables	Countries	Period	Estimation methods	Main Findings
Cummings et al. (2021)	NLLC	REM FDI AID CREDIT	Tenure abroad	29 developing countries	2001–2010	NB, GMM	Positive effect of REM from migrants who reside less than a year. No effect of FDI. Positive effect of AID. Negative effect of CREDIT

Main independent variables are: *REM* financial remittances *FDI* foreign direct investment *AID* foreign aid *CREDIT* credit to the private sector. Estimation methods are: *NB* negative binomial *GMM* generalized Estimation method of moments *IV* instrumental variables *2SLS/IV* two stage least squares/instrumental variables *GLS* generalized least squares; *FGLS* feasible generalized least squares

that remittances are more likely to spur new firms in low and lower-middle-income countries than in high and upper-middle-income ones. In addition, he performs a subsample analysis at the continental level, showing that the average marginal effect is negative in Africa, positive in Asia and Latin American and Caribbean countries, and statistically insignificant in Europe. Among the control variables, credit and foreign direct investment are considered; credit almost always reports a positive effect, and the latter is positive for the subsample of low and lower-middle-income countries. Concerning the Africa subsample, when statistically significant, both variables display a negative effect.

Finally, the contribution of Cummings et al. (2021) shifts the focus of the analysis to migrant tenure abroad. For a sample of 29 developing countries from 2001 to 2010, the authors investigate how migrant tenure abroad influences remittance use for new firm creation back home. They find that remittances from migrants residing abroad for less than a year significantly increase venture founding rates. Their control variables include AID, FDI, and bank credit. While AID, when significant, reports a negative effect, no statistically significant coefficient is detected for FDI. As for credit, Cummings et al. (2021) find that, when significant, this variable's coefficient always reports a negative effect.

Therefore, from the relevant literature, we infer that there is no definitive evidence on the impact of remittances, AID, and FDI on new firms' creation. Additionally, empirical analysis of the interaction effects between each pair of external sources is lacking. Moreover, there is a lack of comparison between new enterprises' external and internal funding sources. Most notably, studies examining the nexus between remittances and African entrepreneurial activity are scarce.

### 3 Empirical investigation

#### 3.1 Sample description, data sources, and summary statistics

Bounded by data availability, our dataset is an unbalanced panel comprising 36 countries (see Table 2), covering the period from 2006 to 2021. Table 3, columns 1 to 3, reports the names, descriptions, and sources of the variables used in the empirical investigation. Almost all the data has been retrieved from The World Bank Development Indicators (WDI) and other specific World Bank (WB) databases. The share of government consumption comes from the Penn World Tables (PWT).

#### 3.2 Dependent variables

The dependent variable is the number of new limited liability companies (NLLC) registered in the private, formal sector. In this regard, it is important to note that in many African countries, informal firms account for up to half of economic activity (La Porta and Shleifer 2014). The exclusion of firms operating in the informal sector most likely leads to an underestimation of the role of internal and external sources

**Table 2** List of countries and colonial links

Country	Colonial link	Country	Colonial link
Benin	France	Mozambique	Portugal
Burkina Faso	France	Mauritania	France
Botswana	United Kingdom	Mauritius	United Kingdom
Central African Rep	France	Malawi	United Kingdom
Côte d'Ivoire	France	Namibia	United Kingdom
Comoros	France	Niger	France
Cabo Verde	Portugal	Nigeria	United Kingdom
Algeria	France	Rwanda	Belgium
Egypt, Arab Rep	United Kingdom	Senegal	France
Ethiopia	Italy	Sierra Leone	United Kingdom
Gabon	France	Chad	France
Ghana	United Kingdom	Togo	France
Guinea	France	Tunisia	France
Kenya	United Kingdom	Tanzania	United Kingdom
Lesotho	United Kingdom	Uganda	United Kingdom
Morocco	France	South Africa	United Kingdom
Madagascar	France	Zambia	United Kingdom
Mali	France	Zimbabwe	United Kingdom

of financing in new firms' creation, and the empirical estimates provided in Sect. 4 should be considered the worst-case scenario.

### 3.3 Main independent variables

The main independent variables are the sources of internal and external funding (See Figs. 1 and 2).

We include per capita personal remittances received (REM) among external sources. REM comprises two components that are personal transfers (current transfers in cash or in-kind between resident and non-resident households) and compensation of employees (the income of border, seasonal, and other short-term workers who are employed in an economy where they are not resident, and of residents employed by non-resident entities).

Another external source is per capita net official development assistance and official aid received (AID). Net official development assistance received "consists of disbursements of loans made on concessional terms and grants by official agencies of the members of the Development Assistance Committee (DAC), by multilateral institutions, and by non-DAC countries to promote economic development and welfare in countries and territories in the DAC list of ODA recipients." Analogously, "net official aid refers to aid flows from official donors to countries and territories in part II of the DAC list of recipients: more advanced countries of Central and Eastern

**Table 3** Name, description, sources, expected sign, and main reference

Name	Description	Source	Expected sign	Main reference*
<b>Dependent variable</b>				
NLLC	New limited liability companies registered in the private, formal sector (number)	WB (Entrepreneurship Database)		
<b>Main explanatory variables</b>				
CREDIT	Domestic credit to the private sector (% of GDP)	WDI	+	Yavuz and Bahadir (2022)
SAVINGS	Gross domestic savings (% of GDP)	WDI	+	Rikwentishe et al. (2015)
REM	Per capita personal remittance received (current US\$)	WDI	+	Bettin et al. (2024)
			-	Ajide and Osinubi (2022)
AID	Per capita net official development assistance and official aid received (current US\$)	WDI	+	Cummings et al. (2021)
			-	Ajide and Osinubi (2022)
FDI	Per capita foreign direct investment, net inflows (current US\$)	WDI	+	Hanusch and Valeer (2015)
			-	Piras (2023)
<b>Control variables</b>				
GDPCCGR	Real GDP per capita growth rate	WDI	+	Bettin et al. (2024)
GDPPC	Real GDP per capita level (constant 2015 US\$)	WDI	+	Yavuz and Bahadir (2022)
			-	Piras (2023)
TRADE	Sum of imports plus exports of goods and services as a share of GDP	WDI	+	Bettin et al. (2024)
EMPAGR	Employment in agriculture (% of total employment)	WDI	+	Piras (2023)
EMPIND	Employment in industry (% of total employment)	WDI	+	Piras (2023)
INFLATION	GDP deflator (annual %)	WDI	+	Cummings and Gamlen (2019)
			-	Ajide and Osinubi (2022)



Table 3 (continued)

Name	Description	Source	Expected sign	Main reference*
MIMIC	Multiple indicators multiple causes model-based estimates of informal output	WB (The Informal Economy database)	+	Laing et al (2022)
GOVCONS	Share of government consumption at current PPPs	PWT	-	Martinez et al. (2015)
GOVEFF	Government Effectiveness index (-2.5/+2.5 scale) where higher values correspond to better governance	WB (Worldwide Governance Indicators)	+	Yavuz and Bahadır (2022) Asongu et al. (2018)
PERTIME	Time (days) required to start a business	WB (doing business database)	-	Munemo (2018)
EDB	Easy of doing business (0–100 scale) that measures how difficult it is to start a business in a country through the gap between its performance and the regulatory best practices worldwide	WB (doing business database)	+	Bettin et al. (2024)

\*Note that not all these studies use NLLC as a dependent variable



Fig. 1 REM, AID and FDI (Current US\$ per capita)

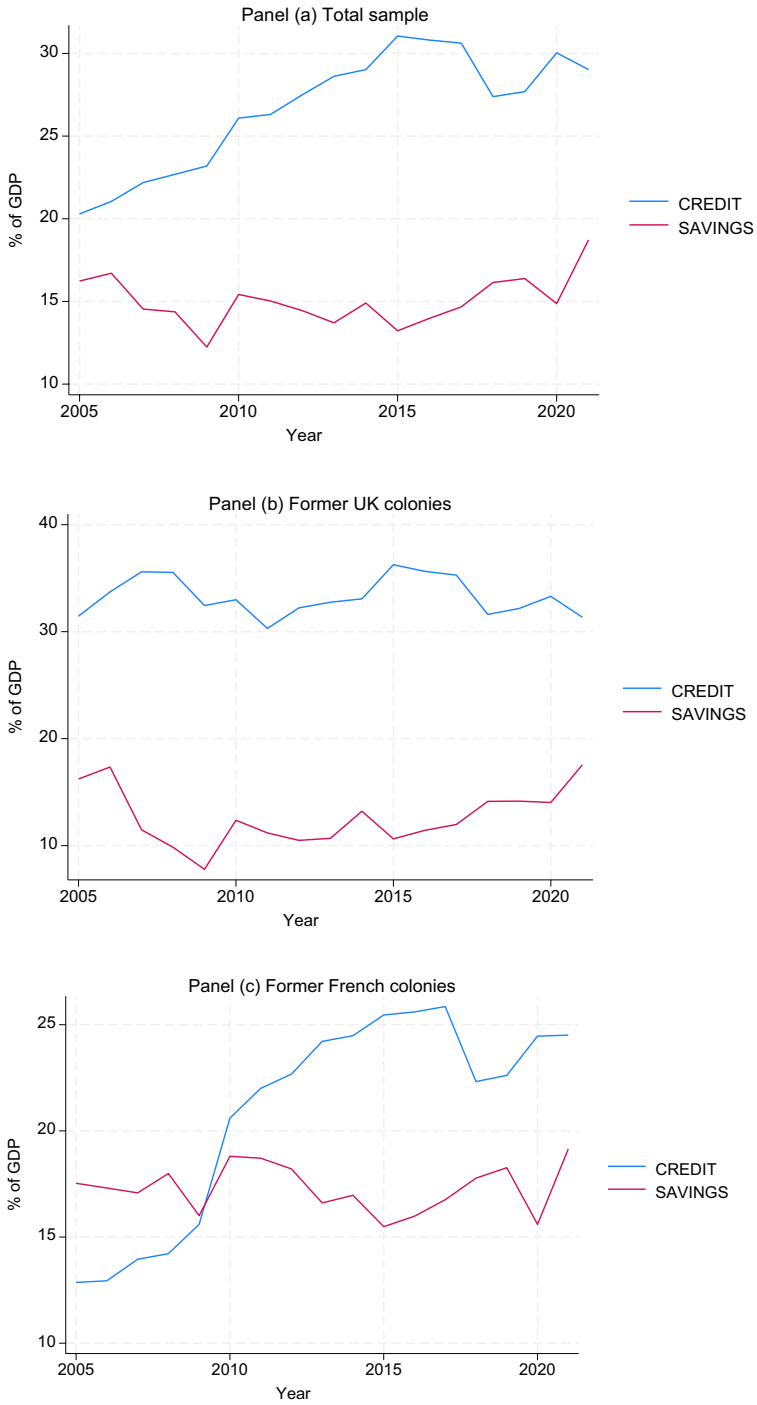


Fig. 2 CREDIT AND SAVINGS (% of GDP)

Europe, the countries of the former Soviet Union, and certain advanced developing countries and territories. Official aid is provided under terms and conditions similar to those for ODA”.

The third external source in our model is net inflows of per capita foreign direct investment (FDI). This variable “refers to direct investment equity flows in the reporting economy. It is the sum of equity capital, reinvestment of earnings, and other capital. Direct investment is a category of cross-border investment associated with a resident in one economy having control or a significant degree of influence on managing an enterprise resident in another economy. Ownership of 10% or more of the ordinary shares of voting stock is the criterion for determining the existence of a direct investment relationship”.

As far as internal sources are concerned, the analysis considers domestic credit to the private sector (CREDIT) and gross domestic savings (SAVINGS), expressed as a GDP percentage. Domestic credit to the private sector “refers to financial resources financial corporations provide to the private sector. For some countries, these claims include credit to public enterprises. The financial corporations include monetary authorities, deposit money banks, and other financial corporations”. As regards gross domestic savings, they are calculated as GDP less final consumption expenditure.

Regarding the expected effects of all sources of financing, we primarily refer to the extensive discussion of possible mechanisms provided in the literature section. Additionally, we summarize the expected signs of estimated coefficients in columns 4 and 5 of Table 3, along with at least one supporting reference for each.

### 3.4 Control variables

The control variables included in the analysis aim to capture different structural characteristics of the investigated countries: economic, socio-political, and institutional variables that supposedly might affect the attractiveness or de-attractiveness of each economy for new firms’ creation.

The economic variables include the growth rate of per capita GDP (GDPPCGR), the level of per capita GDP (GDPPC), the share of import plus exports over GDP (TRADE), the share of employment in agriculture (EMPAGR), the share of employment in industry (EMPIND), the inflation rate (INFLATION), and an estimate of the informal economy (MIMIC). The institutional and socio-political variables are subsumed by the share of government consumption over GDP (GOVCONS), the government effectiveness index (GOVEFF), the number of days required to start a business (PERTIME), and the ease of doing business index (EDB).

The variables GDPPCGR and GDPPC are often considered in empirical analyses to measure the overall economic environment and are expected to influence new firm creation positively. Regarding GDPPCGR, expectations are generally fulfilled (cf., for example, Piras 2023; Bettin et al. 2024). However, empirical evidence for GDPPC is not unanimous. While it can spur new businesses, as shown by Yavuz and Bahadır (2022), the relationship between new firms and GDPPC in developing countries can be negative, as indicated by Stel et al. (2005). This negative relationship

may occur because entrepreneurship in developing regions is often characterized by necessity-based rather than opportunity-based initiatives, as explained by Acs et al. (1994) and Wennekers and Thurik (1999). Therefore, necessity-based entrepreneurship may be reduced when the country experiences higher growth and better opportunities in the labor market (Ajide and Osinubi 2022). The possibility of a negative relationship between GDPPC and NLLC has recently been confirmed by Piras (2023) for Latin America and Caribbean countries.

TRADE links the country's economy to international trade, and a direct relationship is expected since new firms can be stimulated when a country's degree of integration in the global economy increases. This result is almost invariably found in the empirical literature (cf., for example, Bettin et al. 2024).

EMPAGR and EMPIND account for the country's economic structure, and since new business creation rates vary considerably by sector, there is no a priori expectation regarding the effect of these two shares on new firms' creation. However, recent findings by Piras (2023) suggest that both shares positively impact African countries, which is also observed for lower-middle-income, high, and upper-middle-income countries.

Regarding INFLATION, its role in the creation of new firms can vary. If it measures uncertainty and market instability, its effect might be negative (Porter and Schawab, 2009), as confirmed by Ajide and Osinubi (2022). However, it could also reflect expansionary monetary policy, indicating a more favorable entrepreneurial environment for new business starts (Cummings and Gamlen 2019; Cummings et al. 2021).

MIMIC, estimating the informal economy, could have a positive or negative role. A positive impact is expected when the informal sector serves as a springboard for firms to enter the formal one (Laing et al., 2022). Conversely, bureaucratic burdens and taxes might discourage firms in the informal sector from formalizing, suggesting a negative relationship. Martinez et al. (2015) argue that economic informality can deter venture funding flows, as formal institutions are expected to provide stronger protection to investors.

Regarding institutional and socio-political variables, GOVCONS is expected to hurt new firms' starts, draining resources from the private sector. Indeed, if government consumption drains resources from the private sector and uses them for unproductive scopes, higher government consumption shares harm new firms' birth. Yavuz and Bahadir (2022) empirically confirm this assumption. Conversely, GOVEFF, measuring the overall quality of public service provision, bureaucracy, and government commitment to policies can be interpreted as an index of "public" inputs required for the government to produce and implement good policies and deliver public goods. Therefore, a positive impact on entrepreneurship is theoretically expected and confirmed in the empirical literature (cf., inter al., Asongu et al. 2018).

PERTIME represents the days required to start a business, and a shorter duration is conducive to entrepreneurship. Scholars like Munemo (2018) confirm that entrepreneurship can be adversely affected by an increase in the time required to establish a start-up. EDB measures the ease of starting a business in a country and positively affects the creation of new firms (Bettin et al. 2024).

As done for the different funding sources, we report the expected impacts of all control variables in columns 4 and 5 of Table 3.

### 3.5 Summary statistics

This subsection presents the summary statistics for the dependent and the main independent variables. As we can see in Table 4, there is a high degree of heterogeneity across African countries. Regarding NLLC, on average, almost 21 thousand new firms are created annually, but huge differences exist between the former UK (36,573) and the French colonies (6737). The minimum and maximum (country-year) values of NLLC vary enormously from 26 (Togo in 2006) to 486,900 (South Africa in 2020). As for the three external financing sources, the mean value of REM is 62.09, 27% higher in the former UK colonies (65.79) compared with the former French ones (51.67). The average values of AID and FDI are 65.12 and 68.99, respectively, and there does not appear to be any appreciable difference between the former UK and French colonies regarding AID. Conversely, regarding FDI, the former UK colonies record a mean value of 77.75, twenty percentage points higher than the French ones (57.67). The two internal sources of financing, CREDIT and SAVINGS, have an average value of 26.81 and 14.98, respectively. CREDIT peaks at 33.25 for the former UK colonies and SAVINGS at 17.28 for the former French colonies.

### 3.6 Methodology and econometric specification

The dependent variable in our study is a count variable that assumes non-negative integer values. Consequently, employing linear regression models such as ordinary least squares (OLS) is inappropriate.<sup>1</sup> Conversely, Poisson and negative binomial (NB) regression models are more appropriate for our empirical analysis (Cameron and Trivedi 2013; Allison and Waterman 2002). A key property of the Poisson distribution, upon which Poisson regression relies, is equidispersion, namely the equality between mean and variance. This property is often violated using count data since overdispersion is frequently encountered, which is true with our data, too (see Fig. 3). The NB model relaxes the equidispersion assumption and allows the mean and variance to differ.<sup>2</sup> Considering this brief discussion, it is unsurprising that almost all empirical works on the determinants of new firms' creation use the NB model as a workhorse in econometric analysis as shown in Table 1 of the literature. Therefore, in the footsteps of the dominant literature, we also choose the NB model for our basic estimates.

<sup>1</sup> Sometimes, count variables are log-transformed and estimated via OLS. This, however, is an unfortunate procedure as it is subject to several drawbacks, such as the loss of zero observations and, most importantly, the inability to correctly model the dispersion of the data in the presence of heteroskedasticity (Santos Silva and Tenreiro 2006).

<sup>2</sup> An LR test on the null hypothesis that the log of the dispersion parameter is zero is reported in all regressions discussed in Sect. 4. If the test rejects the null value, the NB model should be preferred.

**Table 4** Summary statistics

Variable	Total sample	Former UK colonies	Former France colonies	Variable	Total sample	Former UK colonies	Former France colonies
NLLC	Mean	20,878	36,573	EMPAGR	Mean	46.85	42.71
	S.D	59,799	83,596		S.D	21.90	21.58
	Median	4790	8710		Median	45.88	45.41
	Min	26	333		Min	4.60	4.60
	Max	486,900	486,900		Max	85.16	74.55
	Mean	62.09	65.79		Mean	14.09	14.21
REM	S.D	88.35	82.67	EMPIND	S.D	8.04	7.45
	Median	16.84	23.56		Median	12.52	13.51
	Min	0.00	0.00		Min	1.88	4.84
	Max	534.95	321.74		Max	34.80	34.80
	Mean	65.12	56.63		Mean	8.42	13.76
	S.D	62.29	40.94		S.D	29.22	44.63
AID	Median	53.86	52.59	INFLAT	Median	4.72	7.44
	Min	0.33	0.33		Min	-18.07	-6.69
	Max	627.35	360.23		Max	604.95	604.95
	Mean	68.99	77.55		Mean	39.49	39.25
	S.D	109.51	99.08		S.D	8.34	11.64
	Median	28.16	35.90		Median	38.87	36.39
FDI	Min	-201.55	-72.13	MIMIC	Min	21.26	21.26
	Max	748.73	480.54		Max	63.30	63.30
	Mean	47.62	47.62		Former France colonies	47.62	47.62
	S.D	20.16	20.16		Former UK colonies	20.16	20.16
	Median	43.30	43.30		Total sample	43.30	43.30
	Min	9.60	9.60		Former France colonies	9.60	9.60
Former France colonies	Max	81.96	81.96	Former UK colonies	Max	81.96	81.96
	Mean	14.67	14.67		Mean	14.67	14.67
	S.D	8.62	8.62		S.D	8.62	8.62
	Median	12.72	12.72		Median	12.72	12.72
	Min	1.88	1.88		Min	1.88	1.88
	Max	33.73	33.73		Max	33.73	33.73

Table 4 (continued)

Variable	Total sample		Former UK colonies	Former France colonies	Variable	Total sample		Former UK colonies	Former France colonies
CREDIT	Mean	26.81	33.25	20.88	GOVCONS	Mean	0.16	0.17	0.16
	S.D	27.23	34.97	19.28		S.D	0.06	0.07	0.05
	Median	16.58	18.57	15.17		Median	0.15	0.15	0.16
	Min	0.00	0.00	2.22		Min	0.05	0.06	0.05
	Max	142.42	142.42	95.51		Max	0.37	0.37	0.34
SAVINGS	Mean	14.98	12.52	17.28	GOVEFF	Mean	-0.61	-0.40	-0.85
	S.D	14.65	15.83	14.57		S.D	0.59	0.63	0.50
	Median	14.34	14.28	14.52		Median	-0.63	-0.50	-0.80
	Min	-38.83	-38.83	-10.58		Min	-1.89	-1.55	-1.89
	Max	60.49	53.84	60.49		Max	1.16	1.16	0.70
GDPPCGR	Mean	1.82	1.95	1.22	PERTIME	Mean	189	193	194
	S.D	4.30	4.59	3.93		S.D	92	87	102
	Median	2.06	2.62	1.57		Median	172	180	176
	Min	-36.78	-22.49	-36.78		Min	53	96	53
	Max	19.94	19.94	17.47		Max	625	566	625
GDPPC	Mean	2091	2827	1704	EDB	Mean	65.96	72.20	60.44
	S.D	2078	2469	1688		S.D	19.94	13.17	23.42
	Median	1213	1511	1021		Median	71.89	74.38	65.29
	Min	306	469	338		Min	16.65	33.43	16.65
	Max	10,959	10,959	7155		Max	95.13	94.48	95.13



Table 4 (continued)

Variable	Total sample	Former UK colonies	Former France colonies	Variable	Total sample	Former UK colonies	Former France colonies
TRADE	Mean	69.49	65.46				
	S.D	31.75	19.65				
	Median	59.50	62.82				
	Min	16.35	31.49				
	Max	163.62	132.38				

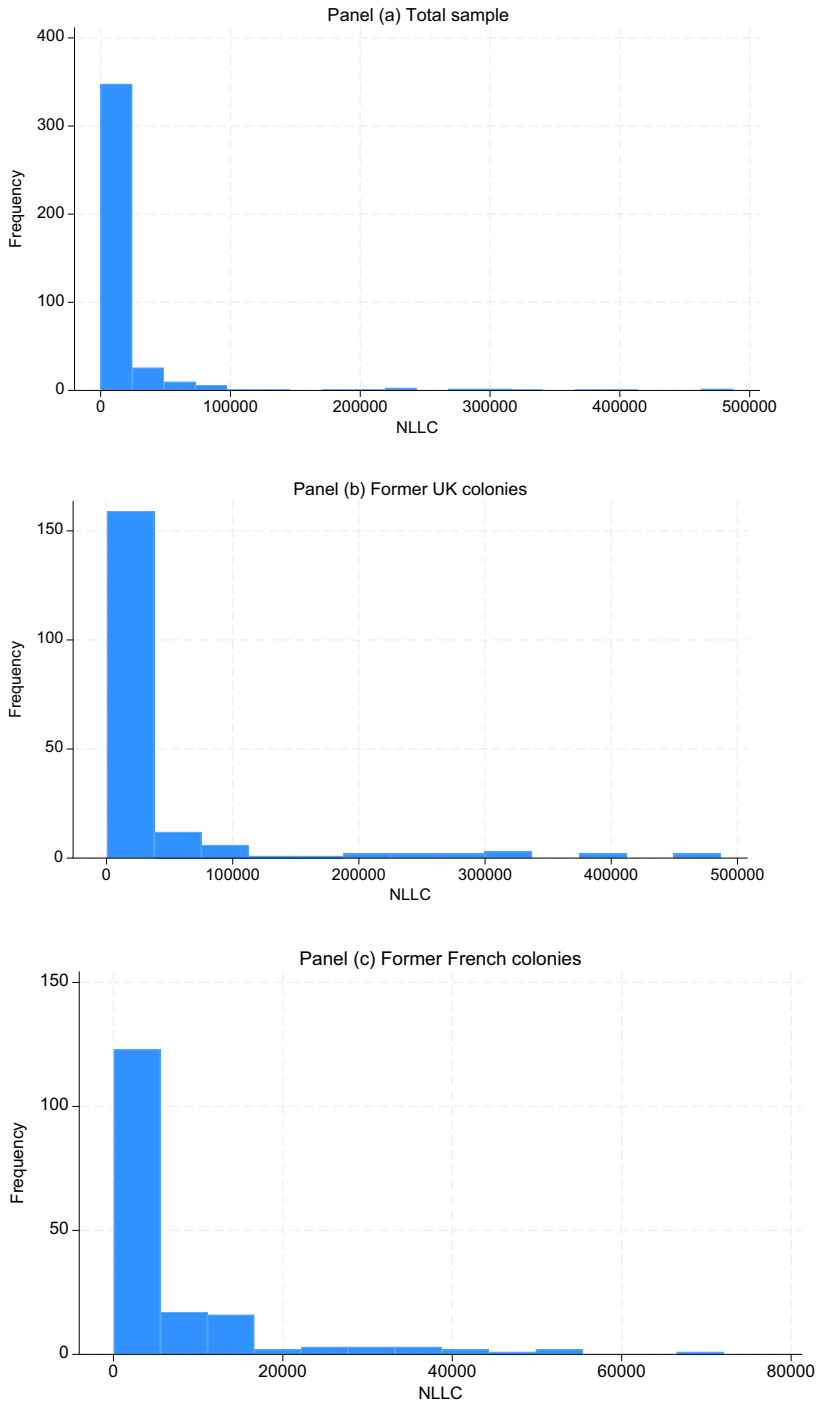


Fig. 3 Distribution of New Limited Liabilities Companies

In a panel data setting, expressed in terms of its log-likelihood function, the negative binomial model takes the following general form:

$$LL = \sum_{i=1}^n \left\{ y_{it} \ln \left( \frac{\alpha \exp(x'_{it}\beta)}{1 + \alpha \exp(x'_{it}\beta)} \right) - \frac{1}{\alpha} \ln (1 + \alpha \exp(x'_{it}\beta)) + \ln \Gamma \left( y_{it} + \frac{1}{\alpha} \right) - \ln \Gamma (y_{it} + 1) - \ln \Gamma \left( \frac{1}{\alpha} \right) \right\}$$

where  $y_{it}$  is the dependent variable (in the present study,  $NLLC_{it}$ ) at time  $t$  for unit  $i$ ,  $x_{it}'$  is a vector of explanatory variables, also including country and time effects,  $\alpha$  is the over-dispersion parameter,  $\beta$  is a vector of coefficients, and  $\Gamma$  is the gamma function. Estimates of  $\beta$ 's and  $\alpha$  can typically be obtained by maximum likelihood (ML) or quasi maximum likelihood (QML) procedures applied to the set of first order conditions derived from the log-likelihood function.

We develop the empirical analysis in three main steps. As a first step, we run separate regressions for each of the five sources of financing (for brevity, we use the variable  $FIN_k$ , where  $k$  corresponds to REM, AID, FDI, CREDIT, and SAVINGS) considering all the control variables in each regression. More formally, we estimate Model 1 where  $\exp(x_{it}'\beta)$  corresponds to:

$$\exp(\beta_0 + \beta_1 FIN_{k,i,t-1} + z'_{it-1}\beta_j)$$

where  $z'_{it-1}$  represents the set of control variables described in Sect. 3.4 including country and time fixed-effects. Notice that to cope with possible reverse causality issues, all explanatory variables are lagged at time  $t-1$ . Then, as the second step, we introduce an interaction term between each pair of financial sources and define Model 2, where  $\exp(x_{it}'\beta)$  corresponds to:

$$\exp(\beta_0 + \beta_1 FIN_{r,i,t-1} + \beta_2 FIN_{l,i,t-1} + \beta_3 (FIN_{r,i,t-1} * FIN_{l,i,t-1}) + z'_{it-1}\beta_j)$$

Models 1 and 2 are estimated at the total sample level and for the two subsamples given by the former UK and French colonies. These estimates provide us with what we consider the baseline findings of our investigation. As a third and final step, we propose a series of additional regressions to test the robustness of our main findings. Results are provided in SubSect. 4.3.

## 4 Results and discussion

### 4.1 Total sample analysis

This subsection provides a concise overview of the principal findings related to the overall sample. Table 5 presents the estimated coefficients for each funding source according to Model 1. Notably, REM and AID exhibit statistically significant coefficients with opposite signs, positive and negative, respectively.

**Table 5** Total sample without interaction terms

	(1)	(2)	(3)	(4)	(5)
REM	2.082*** (0.705)				
AID		- 1.328** (0.526)			
FDI			- 0.423 (0.312)		
CREDIT				0.003 (0.004)	
SAVINGS					0.004 (0.004)
GDPPCGR	0.005 (0.006)	0.005 (0.007)	0.006 (0.006)	0.008 (0.006)	0.004 (0.007)
GDPPC	- 0.297*** (0.091)	- 0.175** (0.080)	- 0.184** (0.077)	- 0.214** (0.084)	- 0.201** (0.080)
TRADE	0.010*** (0.002)	0.009*** (0.002)	0.009*** (0.002)	0.009*** (0.002)	0.009*** (0.002)
EMPAGR	0.020** (0.010)	0.019** (0.010)	0.019* (0.010)	0.008 (0.015)	0.013 (0.011)
EMPIND	0.112*** (0.023)	0.109*** (0.023)	0.103*** (0.023)	0.090*** (0.028)	0.103*** (0.024)
INFLATION	- 0.001 (0.001)	- 0.001 (0.001)	- 0.001 (0.001)	0.001 (0.001)	- 0.001 (0.001)
MIMIC	0.055** (0.022)	0.068*** (0.023)	0.064*** (0.023)	0.084*** (0.025)	0.068*** (0.024)
GOVCONS	- 0.490 (1.179)	- 0.974 (1.196)	- 0.759 (1.202)	- 1.529 (1.270)	- 0.614 (1.186)
GOVEFF	0.636*** (0.177)	0.630*** (0.184)	0.736*** (0.186)	0.877*** (0.182)	0.735*** (0.187)
PERTIME	- 0.004*** (0.001)	- 0.003*** (0.001)	- 0.003*** (0.001)	- 0.002*** (0.000)	- 0.003*** (0.001)
EDB	0.006** (0.002)	0.007*** (0.002)	0.007*** (0.002)	0.006** (0.002)	0.006** (0.002)
Obs	355	355	355	323	351
LR test ( <i>p</i> -value)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Pseudo R-sq	0.179	0.179	0.178	0.185	0.178

Robust standard errors in brackets. Regressions include country and time fixed-effects. The STATA command nbreg has been used. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ . LR test (*p*-value) is the probability of a  $\chi^2$  test on the null hypothesis that the log of the dispersion parameter is zero, in which case a Poisson model would be appropriate

Regarding the control variables, TRADE, EMPAGR, EMPIND, MIMIC, GOV-EFF, and EDB exert positive influences on NLLC, whereas GDPPC and PERTIME

appear to deter new establishments. Conversely, GDPPCGR, INFLATION, and GOVCONS fail to attain statistical significance. Two of these signs are worth of little more attention. The negative coefficient of GDPPC yields an intriguing implication, aligning with prior scholarly discourse, indicating that entrepreneurship in Africa predominantly arises from necessity and survival imperatives (Stel et al. 2005; Acs 2006; Brás and Soukiazis 2018). It is also worth mentioning the positive effect of MIMIC, which implies, as argued by Laing et al. (2022), that in Africa, the informal sector can act as the springboard for firms to enter the informal one. To compare these results with previous literature, the reader can refer to the expected signs reported in Table 3.

#### 4.1.1 Results with interaction effects between external sources of financing

Here, the focus shifts to the outcomes derived from the estimation of Model 2. Let us first consider the external financing sources. As shown in Table 6, interaction effects are introduced between every pair of sources. Given that the results concerning the control variables confirm the scenario presented in Table 5, our attention is directed solely towards the interaction effects.

The introduction of the interaction term between REM and AID (Table 6, column 1) confirms the REM's positive coefficient but renders the AID's estimated coefficient statistically insignificant. Nonetheless, the interaction term displays a highly statistically significant negative sign, indicating that the two funding sources may function as substitutes. Consequently, for high values of one source, the other could potentially impede NLLC.

These results partially diverge from the findings of Ajide and Osinubi (2022) related to Africa, who observe a negative influence of both funding sources on entrepreneurship in Africa, alongside a positive coefficient for their interaction term. However, it is important to interpret these disparities cautiously, as Ajide and Osinubi (2022) employ new firms' density as the dependent variable and different econometric estimation methods.

To gain a deeper insight into these outcomes, Fig. 4 portrays the (non-linear) average marginal effect of REM on NLLC across various centiles of AID (Panel (a)), and conversely, the effect of AID on NLLC across different centiles of REM (Panel (b)). Vertical bars indicate the 90% confidence interval. Despite the figure illustrating a slightly diminishing trend, the impact of REM remains consistently positive and statistically significant up to the 90th centile. Conversely, the influence of AID on NLLC is statistically insignificant up to the 75th centile; after that, its effect becomes negative. These findings suggest that while the positive effect of remittances on NLLC persists, an inverse association between AID and NLLC emerges with increasing levels of remittances.

When REM and FDI interact (Table 6, column 2), the results validate the estimated coefficients presented in Table 5. However, the negative and statistically significant interaction term suggests that for high values of one source, the other might adversely affect NLLC. Figure 4, Panel (d), reaffirms the positive influence of

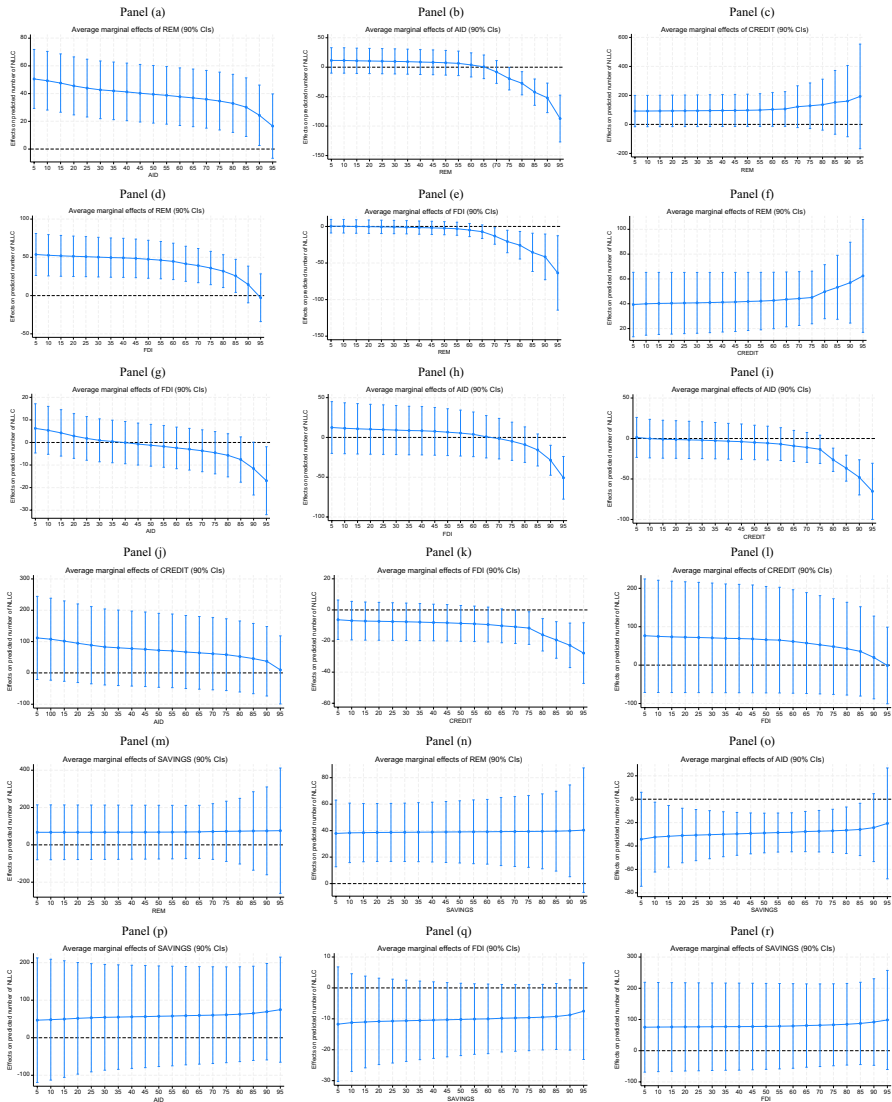
**Table 6** Total sample with interaction effects between external sources

	(1)	(2)	(3)
	REM-AID	REM-FDI	AID-FDI
REM	2.658*** (0.644)	2.661*** (0.824)	
AID	0.650 (0.738)		0.663 (1.013)
FDI		0.020 (0.320)	0.407 (0.356)
REM*AID	-12.314*** (3.444)		
REM*FDI		-7.671** (3.623)	
AID*FDI			-8.495** (3.433)
GDPPCGR	0.003 (0.007)	0.007 (0.006)	0.006 (0.006)
GDPPC	-0.268*** (0.090)	-0.207** (0.091)	-0.174** (0.078)
TRADE	0.009*** (0.002)	0.010*** (0.002)	0.009*** (0.002)
EMPAGR	0.017* (0.009)	0.020** (0.009)	0.020** (0.009)
EMPIND	0.109*** (0.021)	0.108*** (0.021)	0.112*** (0.022)
INFLATION	-0.001 (0.001)	-0.001 (0.001)	-0.001 (0.001)
MIMIC	0.050** (0.022)	0.055*** (0.021)	0.055** (0.022)
GOVCONS	-0.659 (1.155)	-0.666 (1.170)	-0.923 (1.175)
GOVEFF	0.524*** (0.176)	0.633*** (0.178)	0.589*** (0.185)
PERTIME	-0.004*** (0.001)	-0.004*** (0.001)	-0.003*** (0.001)
EDB	0.006** (0.002)	0.005** (0.002)	0.007*** (0.002)
Obs	355	355	355
LR test ( <i>p</i> -value)	(0.000)	(0.000)	(0.000)
Pseudo R-sq	0.181	0.180	0.180

See Table 5

remittances on NLLC up to the 85th centile. At the same time, Panel (e) indicates that the effect of FDI turns negative for high values of REM (above the 70th centile).

Neither variable attains statistical significance regarding the relationship between AID and FDI (Table 6, column 3). However, their interaction yields a negative and statistically significant coefficient, indicating that these two external funding sources are substitutes for financing new firms. As depicted in Fig. 4, the effect of FDI remains statistically insignificant up to the 90th centile, beyond which it becomes negative (Panel (g)). Likewise, the impact of AID on NLLC turns negative above the 85th centile of FDI (Panel (h)).



**Fig. 4** Average marginal effects of different funding sources (Total sample)

### 4.1.2 Results with interaction effects between external and internal sources of financing

Delving into the interaction between external and internal financing sources, let us start with CREDIT (Table 7, columns 1 to 3). Notably, this financing source never attains statistical significance. Specifically, when CREDIT interacts with REM (column 1), only REM demonstrates a statistically significant positive coefficient. Neither CREDIT nor the interaction term exhibits any discernible impact on NLLC. Consequently, CREDIT and REM emerge as two distinct financing channels for fostering the creation of new firms. Conversely, neither variable is significant when CREDIT interacts with AID, but the interaction term is negative and statistically significant. Consequently, CREDIT serves as a substitute for AID. Panel (i) of Fig. 4 illustrates that AID negatively affects NLLC for high values of CREDIT (above the 75th centile). Regarding CREDIT, its impact diminishes with increasing AID values, yet it remains statistically insignificant for all AID centiles (Panel (j)). Lastly, when CREDIT interacts with FDI (column 3), neither variable nor their interaction yields any discernible impact on NLLC.

The results concerning SAVINGS (Table 7, columns 4 to 6) affirm that this variable does not influence NLLC or interact with external financial sources. Only REM (with a positive effect in column 4) and AID (displaying a negative sign in column 5) exhibit a statistically significant effect on NLLC.

## 4.2 Subsample analysis

In this subsection, attention shifts to the subsample level, where countries are divided into two groups based on their historical status as former British or French colonies. This division allows us to underscore significant differences between these two groups of countries.

### 4.2.1 Former British colonies

Table 8 presents the estimates of Model 1 for the former UK colonies. Compared to the results in Table 5, several differences become apparent. Firstly, concerning the financing sources, REM and AID no longer exhibit statistical significance. Secondly, GDPPC and MIMIC fail to achieve significance among the economic control variables. Thirdly, among the institutional control variables, only PERTIME maintains its anticipated negative impact on new firm creation.

Moving on to Model 2 and the interaction effects introduced among external sources of financing (Table 9), the analysis provides the following evidence. In the case of REM and AID (Table 9, column 1), the former UK colonies substantially replicate the scenario observed at the full sample level (Table 6, column 1): REM and AID confirm a positive coefficient, yet only REM exhibits statistical significance. Furthermore, their negative interaction implies a detrimental effect of AID above the 70th centile of REM (Fig. 5, Panel (b)) and a positive effect of REM up to the 80th centile of AID (Fig. 5, Panel (a)). Beyond that threshold, REM loses



**Table 7** Total sample with interaction effects between external and internal sources

	(1)	(2)	(3)	(4)	(5)	(6)
	CREDIT			SAVINGS		
REM	2.713** (1.190)			2.045*** (0.723)		
AID		0.316 (1.108)			-1.675** (0.828)	
FDI			-0.294 (0.460)			-0.597 (0.499)
CREDIT	0.005 (0.004)	0.006 (0.004)	0.003 (0.004)			
SAVINGS				0.004 (0.005)	0.002 (0.005)	0.004 (0.004)
REM*CREDIT	-0.000 (0.018)					
CREDIT*AID		-0.033* (0.018)				
CREDIT*FDI			-0.010 (0.007)			
REM*SAVINGS				-0.005 (0.028)		
SAVINGS*AID					0.015 (0.039)	
SAVINGS*FDI						0.006 (0.014)
GDPPCGR	0.010** (0.005)	0.006 (0.006)	0.009* (0.005)	0.004 (0.006)	0.003 (0.007)	0.005 (0.006)
GDPPC	-0.366*** (0.097)	-0.210** (0.085)	-0.168** (0.079)	-0.304*** (0.089)	-0.193** (0.078)	-0.190** (0.079)
TRADE	0.009*** (0.002)	0.008*** (0.002)	0.009*** (0.002)	0.010*** (0.002)	0.009*** (0.002)	0.010*** (0.002)
EMPAGR	0.011 (0.014)	0.005 (0.014)	0.008 (0.015)	0.014 (0.011)	0.011 (0.011)	0.013 (0.011)
EMPIND	0.093*** (0.029)	0.086*** (0.027)	0.089*** (0.028)	0.108*** (0.024)	0.103*** (0.023)	0.100*** (0.024)
INFLATION	0.002** (0.001)	0.002 (0.001)	0.002 (0.001)	-0.001 (0.001)	-0.001 (0.001)	-0.001 (0.001)
MIMIC	0.072*** (0.023)	0.082*** (0.025)	0.086*** (0.024)	0.059** (0.023)	0.071*** (0.024)	0.067*** (0.024)
GOVCONS	-1.635 (1.207)	-1.947 (1.281)	-1.778 (1.258)	-0.511 (1.181)	-0.999 (1.204)	-0.734 (1.236)
GOVEFF	0.790*** (0.178)	0.753*** (0.179)	0.952*** (0.186)	0.665*** (0.175)	0.668*** (0.186)	0.775*** (0.190)

**Table 7** (continued)

	(1)	(2)	(3)	(4)	(5)	(6)
	CREDIT			SAVINGS		
PERTIME	-0.002*** (0.001)	-0.002*** (0.000)	-0.002*** (0.000)	-0.003*** (0.001)	-0.003*** (0.001)	-0.003*** (0.001)
EDB	0.005** (0.002)	0.006*** (0.002)	0.006** (0.002)	0.005* (0.003)	0.006** (0.002)	0.006** (0.002)
Obs	323	323	323	351	351	351
LR test ( <i>p</i> -value)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Pseudo R-sq	0.188	0.187	0.186	0.179	0.179	0.178

See Table 5

its statistical significance. Estimating the model with REM and FDI (Table 9, column 2) yields no statistically significant coefficients for funding sources and their interaction term. Finally, the regression involving AID and FDI (Table 9, column 3) presents negative coefficients for both variables and a positive interaction term, all statistically significant. This indicates that AID and FDI complement each other when creating new firms. In this scenario, the impact of AID increases with FDI, but it remains negative and statistically significant up to the 85th centile, as demonstrated in Fig. 5, Panel (h). Regarding FDI, its impact on NLLC is never statistically significant across all centiles of AID (Fig. 5, Panel (g)). The complementary nature of these two funding sources introduces a substantial novelty for the UK colonies compared to the total sample of countries.

The interaction mechanisms between external and internal financial sources are analyzed in Table 10. Starting with CREDIT, when significant, this variable exhibits a positive coefficient. More in detail, in the model involving REM and CREDIT (Table 10, column 1), both variables show a positive and statistically significant estimated coefficient. At the same time, the interaction term does not achieve significance. In the model with AID and CREDIT (Table 10, column 2), we find no significant role for either funding source or their interaction term. Finally, in the model involving FDI and CREDIT (Table 10, column 3), statistically significant coefficients are observed only for CREDIT and the interaction term, with positive and negative signs, respectively. This outcome suggests that these two sources act as substitutes. Panel (k) of Fig. 5 illustrates that the impact of FDI on NLLC decreases as CREDIT increases and becomes statistically significant from the 85th centile onwards. Conversely, the effect of CREDIT on NLLC, though diminishing, remains positive and statistically significant up to the 55th centile of FDI (Fig. 5, Panel (l)).

Regarding SAVINGS, a statistically significant coefficient is estimated only when this variable is examined in conjunction with AID (Table 10, column 5). Both exhibit a negative sign in this scenario, but their interaction term is positive. As depicted in Fig. 5, Panel (o), the average marginal effect of AID at various centiles of SAVINGS, though increasing, remains negative until the 65th centile. Subsequently, it becomes statistically insignificant up to the 95th centile and positive and

**Table 8** Sub-sample of former UK colonies without interaction terms

	(1)	(2)	(3)	(4)	(5)
REM	0.841 (0.683)				
AID		-0.697 (0.531)			
FDI			-0.128 (0.400)		
CREDIT				0.005 (0.004)	
SAVINGS					-0.002 (0.005)
GDPPCGR	-0.002 (0.010)	-0.003 (0.010)	-0.002 (0.010)	-0.003 (0.005)	-0.001 (0.010)
GDPPC	0.051 (0.124)	0.106 (0.106)	0.110 (0.105)	0.146* (0.088)	0.109 (0.109)
TRADE	0.010*** (0.003)	0.010*** (0.003)	0.010*** (0.003)	0.010*** (0.002)	0.009*** (0.003)
EMPAGR	0.051*** (0.009)	0.050*** (0.009)	0.051*** (0.009)	0.065*** (0.013)	0.054*** (0.010)
EMPIND	0.177*** (0.031)	0.175*** (0.031)	0.175*** (0.031)	0.210*** (0.037)	0.178*** (0.031)
INFLATION	-0.001 (0.001)	-0.000 (0.001)	-0.001 (0.001)	0.002* (0.001)	-0.001 (0.001)
MIMIC	-0.024 (0.033)	-0.014 (0.033)	-0.020 (0.033)	0.024 (0.035)	-0.023 (0.035)
GOVCONS	0.439 (1.016)	-0.026 (1.051)	0.222 (1.038)	0.234 (1.126)	0.164 (1.037)
GOVEFF	0.142 (0.280)	0.210 (0.278)	0.199 (0.285)	0.143 (0.183)	0.165 (0.295)
PERTIME	-0.003*** (0.001)	-0.003*** (0.001)	-0.003*** (0.001)	-0.002*** (0.000)	-0.003*** (0.001)
EDB	0.004 (0.005)	0.005 (0.004)	0.005 (0.005)	0.002 (0.005)	0.005 (0.005)
Obs	165	165	165	143	161
LR test ( <i>p</i> -value)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Pseudo R-sq	0.190	0.190	0.190	0.204	0.189

See Table 5

statistically significant. While increasing with higher AID values, the variable SAVINGS remains statistically significant only in the region of negative values up to the 25th centile (Fig. 5, Panel (p)).

**Table 9** Sub-sample of former UK colonies with interaction effects between external sources

	(1)	(2)	(3)
	<b>REM-AID</b>	<b>REM-FDI</b>	<b>AID-FDI</b>
REM	2.581*** (0.966)	0.749 (1.013)	
AID	0.433 (0.613)		-2.833*** (1.070)
FDI		-0.082 (0.418)	-1.006* (0.579)
REM*AID	-16.982*** (6.160)		
REM*FDI		0.724 (4.950)	
AID*FDI			10.314** (4.686)
GDPPCGR	-0.003 (0.010)	-0.002 (0.010)	-0.003 (0.010)
GDPPC	-0.032 (0.132)	0.046 (0.116)	0.141 (0.104)
TRADE	0.010*** (0.003)	0.010*** (0.003)	0.010*** (0.003)
EMPAGR	0.045*** (0.009)	0.051*** (0.010)	0.051*** (0.009)
EMPIND	0.164*** (0.030)	0.177*** (0.032)	0.173*** (0.030)
INFLATION	-0.001 (0.001)	-0.001 (0.001)	-0.000 (0.001)
MIMIC	-0.004 (0.033)	-0.024 (0.033)	-0.011 (0.032)
GOVCONS	-0.376 (1.126)	0.404 (1.021)	-0.359 (1.017)
GOVEFF	0.270 (0.279)	0.154 (0.269)	0.229 (0.271)
PERTIME	-0.004*** (0.001)	-0.003*** (0.001)	-0.003*** (0.001)
EDB	0.001 (0.005)	0.004 (0.005)	0.005 (0.004)
Obs	165	165	165
LR test ( <i>p</i> -value)	(0.000)	(0.000)	(0.000)
Pseudo R-sq	0.194	0.190	0.192

See Table 5

Finally, regarding control variables, results in Tables 9 and 10 confirm the main findings of Table 8. Regarding GDPPC, given the interpretation of the negative sign obtained at the full sample level, the result suggests that entrepreneurship in the

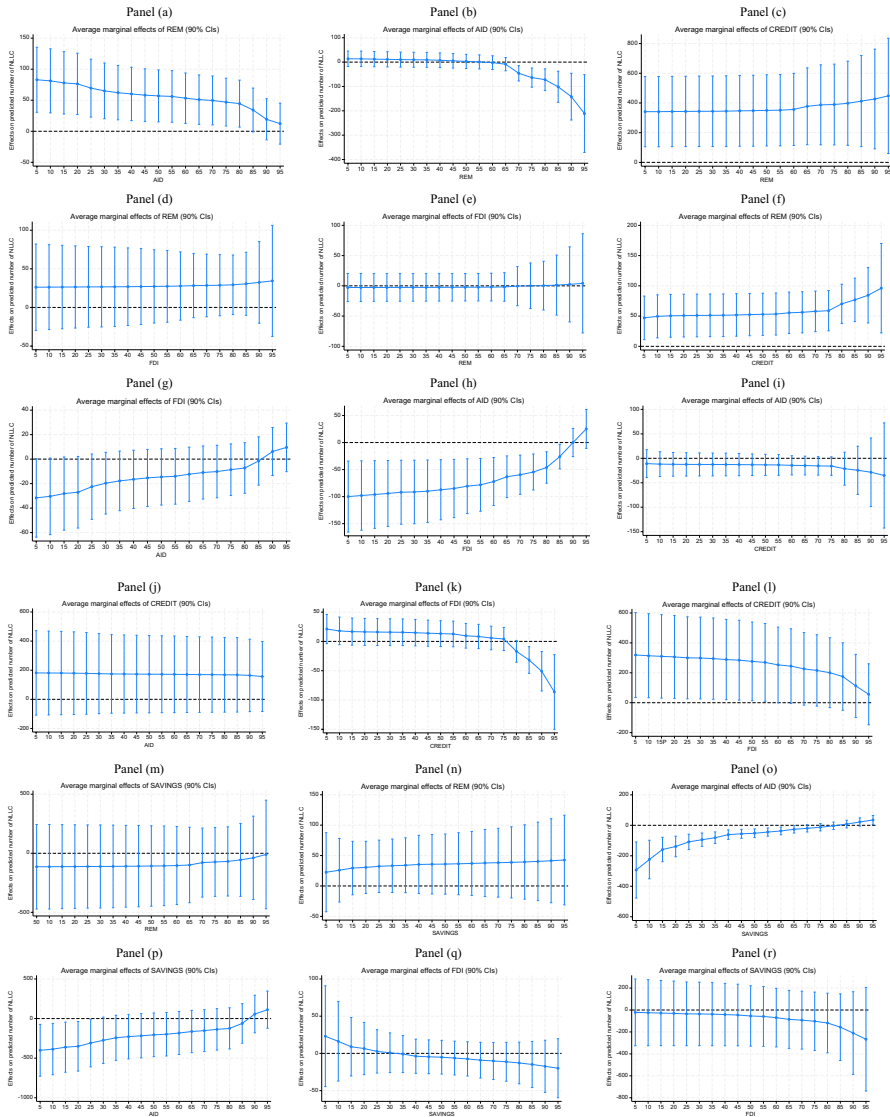


Fig. 5 Average marginal effects of different funding sources (Former UK colonies)

former UK colonies may be more than just driven by necessity. In these countries, locals might seize better opportunities to establish successful firms, thus breaking the negative correlation between NLLC and GDP per capita. Concerning institutional variables, no significant differences exist among the former British colonies that could impact new firms.

**Table 10** Sub-sample of former UK colonies with interaction effects between external and internal sources

	(1)	(2)	(3)	(4)	(5)	(6)
	CREDIT			SAVINGS		
REM	2.388* (1.219)			0.837 (0.686)		
AID		-0.399 (0.569)			-3.087*** (0.700)	
FDI			0.846 (0.588)			0.146 (0.548)
CREDIT	0.009** (0.004)	0.005 (0.004)	0.008* (0.004)			
SAVINGS				-0.003 (0.007)	-0.013** (0.006)	-0.000 (0.005)
REM*CREDIT	-0.007 (0.013)					
CREDIT*AID		-0.003 (0.014)				
CREDIT*FDI			-0.020*** (0.007)			
REM*SAVINGS				0.012 (0.035)		
SAVINGS*AID					0.122*** (0.029)	
SAVINGS*FDI						-0.021 (0.028)
GDPPCGR	0.001 (0.005)	-0.004 (0.005)	-0.004 (0.005)	-0.001 (0.010)	-0.001 (0.010)	-0.001 (0.010)
GDPPC	-0.027 (0.109)	0.138 (0.092)	0.188** (0.089)	0.042 (0.124)	0.029 (0.109)	0.121 (0.107)
TRADE	0.010*** (0.002)	0.010*** (0.002)	0.010*** (0.002)	0.010*** (0.003)	0.009*** (0.003)	0.009*** (0.003)
EMPAGR	0.064*** (0.014)	0.063*** (0.014)	0.067*** (0.013)	0.055*** (0.011)	0.049*** (0.010)	0.054*** (0.010)
EMPIND	0.199*** (0.040)	0.207*** (0.037)	0.218*** (0.037)	0.179*** (0.031)	0.162*** (0.030)	0.178*** (0.031)
INFLATION	0.003*** (0.001)	0.002* (0.001)	0.002** (0.001)	-0.001 (0.001)	-0.000 (0.001)	-0.001 (0.001)
MIMIC	0.020 (0.033)	0.028 (0.038)	0.023 (0.034)	-0.029 (0.037)	-0.020 (0.033)	-0.021 (0.036)
GOVCONS	-0.078 (1.010)	-0.087 (1.341)	0.399 (1.072)	0.327 (1.010)	-0.449 (0.992)	-0.098 (1.129)
GOVEFF	0.020 (0.188)	0.165 (0.182)	0.192 (0.183)	0.150 (0.259)	0.367 (0.276)	0.155 (0.292)

**Table 10** (continued)

	(1)	(2)	(3)	(4)	(5)	(6)
	CREDIT			SAVINGS		
PERTIME	-0.002*** (0.000)	-0.002*** (0.000)	-0.001*** (0.000)	-0.003*** (0.001)	-0.003*** (0.001)	-0.003*** (0.001)
EDB	-0.001 (0.005)	0.001 (0.006)	0.001 (0.005)	0.004 (0.005)	0.005 (0.005)	0.006 (0.005)
Obs	143	143	143	161	161	161
LR test ( <i>p</i> -value)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Pseudo R-sq	0.207	0.204	0.205	0.190	0.194	0.190

See Table 5

#### 4.2.2 Former French colonies

Turning our attention to the former French colonies, notable differences emerge from the total sample and the subsample of former UK colonies. As demonstrated in Table 11, the estimation results for Model 1 indicate that SAVINGS is the only one that attains statistical significance among the financing variables. Regarding the control variables, it is noteworthy that the estimates yield nearly opposite findings compared to the former UK colonies. For the former French colonies, GDPPCGR and GDPPC influence NLLC, with the former having a positive effect and the latter a negative one. Thus, necessity-based rather than opportunity-based reasons may underpin the creation of new firms in this subsample. Furthermore, only TRADE, MIMIC, GOVEFF, PERTIME, and EDB significantly determine NLLC among the remaining control variables.

Estimates of Model 2 are presented in Tables 12 and 13. Regarding external sources, columns 1–3 indicate no impact on NLLC. This lack of effect persists even when they interact with CREDIT, which is also insignificant (Table 13, columns 1–3). Some interpretable results are obtained only when external sources interact with SAVINGS (Table 13, columns 4–6). In this case, when statistically significant, SAVINGS exhibit a positive sign. The only external source that is statistically meaningful is AID (Table 13, column 5), which displays a positive coefficient. Moreover, its interaction with SAVINGS is negative, suggesting a substitutability relationship between them. As depicted in Fig. 6, Panel (o), this result implies that the impact of AID on NLLC is positive up to about the 40th centile of SAVINGS. It becomes insignificant until the 80th centile and then turns negative and statistically significant. Conversely, the impact of SAVINGS, although decreasing as AID increases, remains statistically significant only in the positive region up to the 55th centile of AID (Fig. 6, Panel (p)).

Concerning the role of control variables, the estimates of Model 2 corroborate the main findings already observed in Model 1 (TRADE and MIMIC lose statistical significance). Thus, in the case of the former French colonies, the prevalence of

**Table 11** Sub-sample of former French colonies without interaction terms

	(1)	(2)	(3)	(4)	(5)
REM	1.007 (2.239)				
AID		4.280 (3.045)			
FDI			-0.516 (0.469)		
CREDIT				0.007 (0.007)	
SAVINGS					0.014* (0.008)
GDPPCGR	0.020*** (0.005)	0.014** (0.006)	0.020*** (0.005)	0.020*** (0.005)	0.019*** (0.005)
GDPPC	-0.370* (0.215)	-0.368* (0.215)	-0.407* (0.218)	-0.158 (0.233)	-0.398* (0.219)
TRADE	0.004* (0.002)	0.004* (0.002)	0.004* (0.002)	0.004* (0.002)	0.002 (0.002)
EMPAGR	-0.026 (0.026)	-0.027 (0.026)	-0.027 (0.027)	-0.029 (0.028)	-0.014 (0.032)
EMPIND	0.018 (0.041)	0.018 (0.037)	0.015 (0.042)	0.014 (0.042)	0.024 (0.045)
INFLATION	0.004 (0.005)	0.004 (0.005)	0.005 (0.005)	0.005 (0.006)	0.002 (0.005)
MIMIC	0.058 (0.037)	0.033 (0.038)	0.055 (0.035)	0.073* (0.038)	0.065* (0.034)
GOVCONS	-0.020 (1.686)	-0.412 (1.659)	-0.147 (1.627)	-0.322 (1.730)	0.013 (1.792)
GOVEFF	0.505** (0.242)	0.546** (0.256)	0.579** (0.276)	0.563** (0.265)	0.452* (0.241)
PERTIME	-0.002*** (0.001)	-0.002*** (0.001)	-0.002*** (0.001)	-0.002*** (0.001)	-0.002*** (0.001)
EDB	0.006** (0.003)	0.007** (0.003)	0.006* (0.003)	0.006* (0.003)	0.004 (0.003)
Obs	154	154	154	148	154
LR test ( <i>p</i> -value)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Pseudo R-sq	0.179	0.180	0.179	0.179	0.179

See Table 5

necessity-driven firms is evident. Within these countries, disparities in institutional quality significantly influence NLLC.



**Table 12** Sub-sample of former French colonies with interaction effects between external sources

	(1)	(2)	(3)
	REM-AID	REM-FDI	AID-FDI
REM	-0.177 (2.324)	1.244 (2.300)	
AID	2.944 (4.653)		6.027 (4.038)
FDI		-0.345 (0.573)	0.583 (0.874)
REM*AID	14.875 (25.603)		
REM*FDI		-5.344 (7.421)	
AID*FDI			-24.382 (17.439)
GDPPCGR	0.015** (0.007)	0.020*** (0.005)	0.012* (0.006)
GDPPC	-0.411** (0.209)	-0.410* (0.219)	-0.466** (0.232)
TRADE	0.004** (0.002)	0.005** (0.002)	0.004* (0.002)
EMPAGR	-0.022 (0.025)	-0.027 (0.026)	-0.024 (0.027)
EMPIND	0.023 (0.033)	0.017 (0.042)	0.024 (0.037)
INFLATION	0.004 (0.005)	0.005 (0.005)	0.005 (0.005)
MIMIC	0.037 (0.040)	0.058 (0.036)	0.016 (0.042)
GOVCONS	-0.249 (1.620)	-0.128 (1.582)	-0.607 (1.546)
GOVEFF	0.574** (0.243)	0.638** (0.267)	0.650** (0.285)
PERTIME	-0.003*** (0.001)	-0.002*** (0.001)	-0.003*** (0.001)
EDB	0.006* (0.003)	0.006* (0.003)	0.005* (0.003)
Obs	154	154	154
LR test ( <i>p</i> -value)	(0.000)	(0.000)	(0.000)
Pseudo R-sq	0.180	0.179	0.181

See Table 5

**Table 13** Sub-sample of former French colonies with interaction effects between external and internal sources

	(1)	(2)	(3)	(4)	(5)	(6)
	CREDIT			SAVINGS		
REM	0.572 (3.666)			4.213 (3.095)		
AID		8.354 (6.749)			10.515*** (2.951)	
FDI			-0.011 (0.754)			-1.159 (0.997)
CREDIT	0.010 (0.011)	0.018 (0.012)	0.004 (0.007)			
SAVINGS				0.019** (0.008)	0.038*** (0.011)	0.012 (0.008)
REM*CREDIT	-0.024 (0.059)					
CREDIT*AID		-0.107 (0.107)				
CREDIT*FDI			-0.029 (0.026)			
REM*SAVINGS				-0.108 (0.074)		
SAVINGS*AID					-0.528*** (0.136)	
SAVINGS*FDI						0.015 (0.025)
GDPPCGR	0.020*** (0.005)	0.012* (0.007)	0.021*** (0.005)	0.019*** (0.005)	0.009* (0.005)	0.020*** (0.005)
GDPPC	-0.162 (0.238)	0.023 (0.236)	-0.232 (0.235)	-0.471** (0.226)	-0.605*** (0.219)	-0.435** (0.220)
TRADE	0.004* (0.002)	0.004* (0.002)	0.005** (0.002)	0.002 (0.002)	0.001 (0.002)	0.003 (0.003)
EMPAGR	-0.030 (0.028)	-0.037 (0.027)	-0.027 (0.029)	-0.006 (0.030)	-0.005 (0.027)	-0.015 (0.032)
EMPIND	0.016 (0.040)	0.014 (0.035)	0.011 (0.042)	0.039 (0.038)	0.064* (0.033)	0.020 (0.046)
INFLATION	0.006 (0.006)	0.005 (0.005)	0.005 (0.006)	0.000 (0.004)	0.001 (0.004)	0.001 (0.005)
MIMIC	0.069* (0.041)	0.046 (0.041)	0.069* (0.038)	0.065* (0.033)	0.011 (0.035)	0.059* (0.034)
GOVCONS	-0.223 (1.809)	-0.862 (1.608)	-0.203 (1.654)	0.114 (1.689)	-1.256 (1.348)	0.205 (1.832)
GOVEFF	0.517** (0.248)	0.610** (0.273)	0.719** (0.292)	0.567** (0.259)	0.609*** (0.235)	0.576** (0.263)

**Table 13** (continued)

	(1)	(2)	(3)	(4)	(5)	(6)
	CREDIT			SAVINGS		
PERTIME	-0.002*** (0.001)	-0.002*** (0.001)	-0.002*** (0.001)	-0.003*** (0.001)	-0.003*** (0.001)	-0.002*** (0.001)
EDB	0.006* (0.003)	0.007** (0.003)	0.006* (0.003)	0.003 (0.003)	0.000 (0.003)	0.004 (0.003)
Obs	148	148	148	154	154	154
LR test ( <i>p</i> -value)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Pseudo R-sq	0.179	0.181	0.180	0.180	0.189	0.180

See Table 5

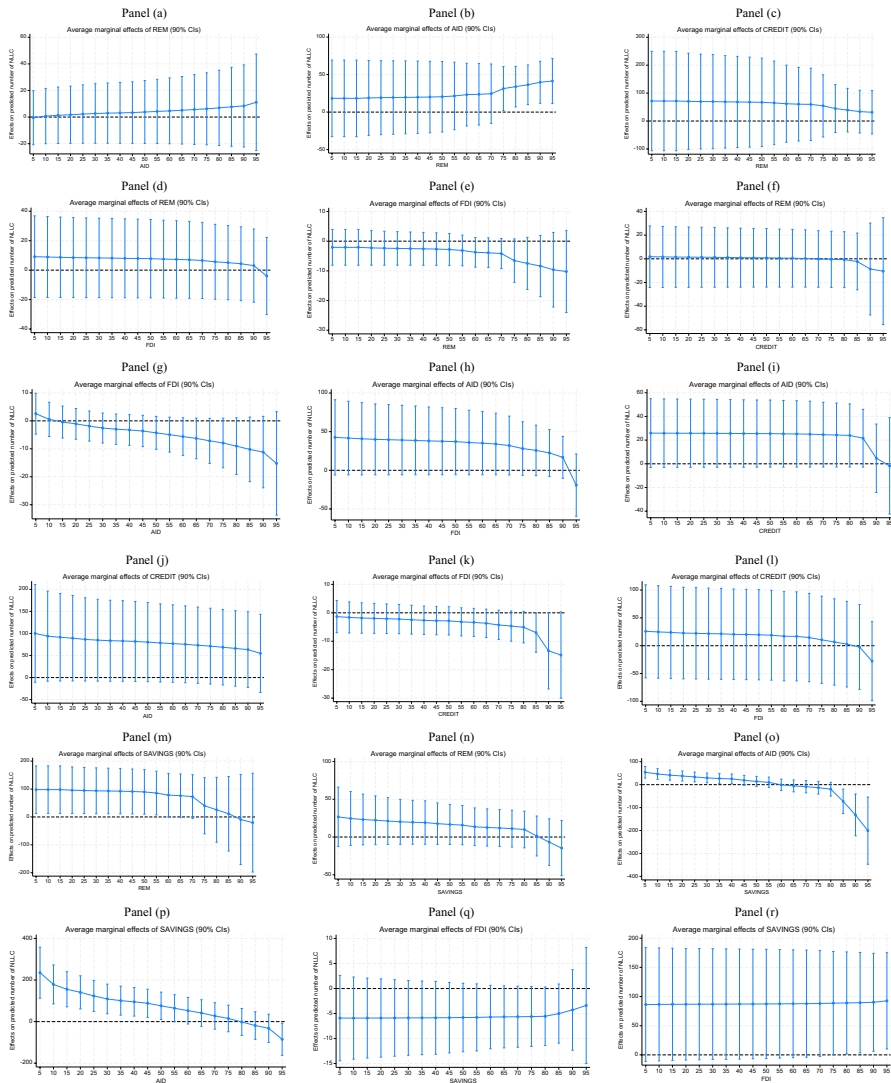
### 4.3 Robustness analysis

In this section, we provide two robustness checks to evaluate the sensitivity of our results to the estimation procedure. This choice moves from two theoretical points.

Firstly, as specified in SubSect. 3.6, in our empirical models, the vector  $x'_{it}$  of explanatory variables contains time and country fixed-effects to control for unobserved individual-specific characteristics. In doing so, we align with the dominant empirical literature regarding new firm creation, which most commonly considers the fixed-effects model in the empirical analysis. To provide a robustness check of our results, we re-estimate considering country random-effects. The tables with robustness estimation results are reported in Appendix A1. Tables 15 and 16 present the results using random-effects at the full sample level. Compared with the results of Tables 6 and 7, the magnitude and signs of the main explanatory variables are almost unchanged. Statistical significance is also confirmed for all main explanatory variables and interaction terms. The robustness results for the two subsamples of the UK and French colonies are reported in Tables 17, 18, 19, and 20. Again, the main results are confirmed (cf. Tables 9 and 10 for the former UK colonies and Tables 12 and 13 for the French ones).

Secondly, consistent with the mainstream reference literature, our dependent variable is the number of new firms established in various countries over different years, without accounting for the population size of these countries. However, establishing one hundred new firms in a country with a population of one million has a different implication than in a country with ten million inhabitants. Neglecting to account for this disparity could result in biased estimates. Therefore, as a second robustness check, we re-estimate our baseline model (Model 2, including time and country fixed-effects), incorporating population size as an exposure variable.<sup>3</sup> At full sample

<sup>3</sup> Technically, introducing population as an exposure variable into regressions implies that the logarithm of the population is entered into the regressions as a separate regressor, and its coefficient is constrained to be one. The exposure variable modifies each observation from a count into a rate per population and allows the counts of NLLC to be comparable across countries with different population levels. We do not want to predict more NLLC just because a country is more populated.



**Fig. 6** Average marginal effects of different funding sources (Former French colonies)

level, Tables 21 and 22 confirm all the results reported in Tables 6 and 7. The results of the two subsamples of the UK and French colonies are reported in Tables 23, 24, 25, and 26. As can be seen, the overall picture is confirmed.

#### 4.4 Discussion

Table 14 provides a summary framework to interpret and discuss the main findings. Panel (a) of the table presents, in bold, the total effect for different funding sources

**Table 14** Main and interaction effects

		<b>Total sample</b>	<b>Former UK colonies</b>	<b>Former French colonies</b>
<b>Panel (a) Main explanatory variables</b>				
<b>REM</b>	<b>Total effect</b>	<b>Positive</b>	<b>Positive</b>	<b>ns</b>
		<i>AID</i>	<i>Negative</i>	<i>Negative</i>
		<i>FDI</i>	<i>Negative</i>	<i>ns</i>
	<i>Interaction terms</i>	<i>CREDIT</i>	<i>ns</i>	<i>ns</i>
		<i>SAVINGS</i>	<i>ns</i>	<i>ns</i>
<b>AID</b>	<b>Total effect</b>	<b>Negative</b>	<b>Negative</b>	<b>Positive</b>
		<i>REM</i>	<i>Negative</i>	<i>ns</i>
		<i>FDI</i>	<i>Negative</i>	<i>Positive</i>
	<i>Interaction terms</i>	<i>CREDIT</i>	<i>Negative</i>	<i>ns</i>
		<i>SAVINGS</i>	<i>ns</i>	<i>Positive</i>
<b>FDI</b>	<b>Total effect</b>	<b>Negative</b>	<b>ns</b>	<b>ns</b>
		<i>REM</i>	<i>Negative</i>	<i>ns</i>
		<i>AID</i>	<i>Negative</i>	<i>Positive</i>
	<i>Interaction terms</i>	<i>CREDIT</i>	<i>ns</i>	<i>Negative</i>
		<i>SAVINGS</i>	<i>ns</i>	<i>ns</i>
<b>CREDIT</b>	<b>Total effect</b>	<b>ns</b>	<b>Positive</b>	<b>ns</b>
		<i>REM</i>	<i>ns</i>	<i>ns</i>
	<i>Interaction terms</i>	<i>AID</i>	<i>Negative</i>	<i>ns</i>
		<i>FDI</i>	<i>ns</i>	<i>Negative</i>
<b>SAVINGS</b>	<b>Total effect</b>	<b>ns</b>	<b>ns</b>	<b>Positive</b>
		<i>REM</i>	<i>ns</i>	<i>ns</i>
	<i>Interaction terms</i>	<i>AID</i>	<i>ns</i>	<i>Positive</i>
		<i>FDI</i>	<i>ns</i>	<i>ns</i>
<b>Panel (b) Control variables</b>				
<b>GDPPCGR</b>		<i>ns</i>	<i>ns</i>	<i>Positive</i>
<b>GDPPC</b>		<i>Negative</i>	<i>ns</i>	<i>Negative</i>
<b>TRADE</b>		<i>Positive</i>	<i>Positive</i>	<i>Positive</i>
<b>EMPAGR</b>		<i>Positive</i>	<i>Positive</i>	<i>ns</i>
<b>EMPIND</b>		<i>Positive</i>	<i>Positive</i>	<i>ns</i>
<b>INFLATION</b>		<i>ns</i>	<i>ns</i>	<i>ns</i>
<b>MIMIC</b>		<i>Positive</i>	<i>ns</i>	<i>ns</i>
<b>GOVCONS</b>		<i>ns</i>	<i>ns</i>	<i>ns</i>
<b>GOVEFF</b>		<i>Positive</i>	<i>ns</i>	<i>Positive</i>
<b>PERTIME</b>		<i>Negative</i>	<i>Negative</i>	<i>Negative</i>
<b>EDB</b>		<i>Positive</i>	<i>ns</i>	<i>Positive</i>

defined after accounting for interaction effects. Below each source, the signs of all interaction terms are shown in italics. Panel (b) of the table indicates the sign of the estimated impact for each additional control variable. In essence, the reported evidence answers our main research questions by showing the heterogeneous impact of various funding sources and the influence of previous colonial history on entrepreneurial development.

Regarding the first aspect, the results at the total-sample level indicate that REM stimulates new business creation, whereas other external sources generally have a negative impact. The positive effect of REM remains despite the negative interactions with AID and FDI. Regarding internal sources, considering interaction effects,

neither SAVINGS nor CREDIT influences NLLC. Furthermore, we observe interaction effects only between CREDIT and AID, where they act as substitutes.

Therefore, compared to what is reported in Table 3, our results confirm the positive effect of remittances (cf., inter al., Bettin et al. 2024), the negative effect of AID (cf., inter al., Ajide and Osinubi 2022) and the negative effect of FDI (cf., inter al., Piras 2023). As for internal sources, the full sample-level analysis does not confirm the positive effect of CREDIT (see, inter al., Yavuz-Bahadir, 2022) and SAVINGS (see, inter al., Rikwentishe et al 2015). Compared to previous literature, our main innovation is identifying these effects by considering the interactions between external and internal financing sources. This aspect has not yet been addressed in the literature.

Turning our attention to the influence of colonialism on entrepreneurial development, Table 14 highlights interesting differences between the former British and French colonies. Firstly, concerning the funding sources, we observe that the former British colonies largely replicate the results found for the whole sample of African countries regarding REM, AID, and SAVINGS. Conversely, different findings emerge regarding FDI, which becomes insignificant, and CREDIT, which becomes positive. As for the former French colonies, only AID and SAVINGS impact new businesses, showing a positive total impact. Therefore, the main differences between the colonies are that REM is positive in the former British colonies and not significant in the former French colonies, AID is negative in the former British colonies and positive in the former French colonies, and, finally, SAVINGS is significant and positive only in the former French colonies.

Secondly, interesting differences also emerge regarding the role of control variables. For the former British colonies, the only variables that affect the number of new firms are those that capture the economic structure and the degree of openness to international trade. GDP per capita growth, GDP per capita, and almost all the institutional variables have no influence. Quite the opposite occurs in the former French colonies. Here, it is important to note the negative sign related to the per capita GDP effect.

All in all, two different models of entrepreneurship development seem to emerge between the two groups of countries. An opportunity-based model for the former British colonies where external and internal funding sources play a more relevant role than institutional variables. A necessity-based model for the former French colonies where institutional variables play a more relevant role than funding sources.

## 5 Conclusions and policy implications

### 5.1 Main findings

In this study, we investigated which factors affect entrepreneurship in Africa. In particular, we focused on internal and external funding sources and assessed their heterogeneous and intertwined roles in boosting new firms' creation. In addition, we tackled the issue of whether the past colonial links could have affected African countries' entrepreneurial development.

Our main findings indicate that, at the continental level, the only external source of financing that positively influences the number of new firms is remittances. In contrast, foreign aid and foreign direct investment have negative effects and interact negatively with remittances. On the other hand, internal sources do not significantly impact entrepreneurship and interact weakly with external sources. When we analyze the data by subsamples, interesting differences emerge. Regarding external sources, the positive role of remittances is confirmed only in the former UK colonies; foreign aid shows opposite effects in the two groups, and foreign direct investment completely loses its statistical significance. It is also noteworthy to observe the impact of internal sources. Credit positively influences new firm creation only in former UK colonies, while savings have a positive impact only in former French colonies. In summary, two distinct entrepreneurial development models seem to emerge in Africa when examining the role of financing sources. This observation is further supported by the differing impacts of control variables between the two subsamples of countries. Notably, GDP per capita growth and GDP per capita levels only show a negative relationship in the former French colonies, suggesting an entrepreneurial model driven more by necessity than opportunity. This finding indicates that the colonial past has significantly influenced African entrepreneurship development and, consequently, the continent's growth trajectory.

The investigation conducted in this study advances the current literature in several significant ways. To our knowledge, no existing research on the determinants of businesses in Africa simultaneously considers internal and external financing sources, nor does it examine their interaction effects. Previous studies have focused exclusively on external sources (Ajide and Osinubi 2022; Asongu et al. 2019) without highlighting any mechanisms of interdependence between these sources. Moreover, to our knowledge, no study has addressed the link between entrepreneurship and colonial legacy.

## 5.2 Policy implications

The main findings of this contribution bear significant policy implications at both national and international levels.

At the national level, considering the constructive impact of remittances on fostering new businesses, African countries should implement policies to promote the productive use of remittances. It is widely acknowledged in Africa that remittances are primarily allocated towards purchasing homes or land and funding education for children, among other purposes.<sup>4</sup> Consequently, while remittances serve to fulfill diverse needs, their use for establishing new enterprises is less prevalent than other alternatives. Among the policy instruments available for this purpose are tax breaks or special legal statuses that could be implemented to incentivize the creation of new firms through remittances (Piras 2023). Furthermore, in alignment with

<sup>4</sup> For example, UNECA (2005; 2006) states that around 80% of remittances are used for consumption and schooling. Based on the Migration Household Survey in Nigeria in 2009, Ruist (2021, p. 162) reports that the great majority of remittances (26%) were on repairing or buying buildings, followed by education (18%), business (16%), purchase of land (11%) and purchase of food (9%).

the objectives outlined in the Agenda 2030 sustainable development goals, efforts to reduce remittance transfer costs should also be prioritized (Olivié and Santillán O'Shea 2022). However, our findings illuminate a distinct role of remittances between the former UK and French colonies. This evidence suggests that relying solely on remittances may not serve as a universal solution to stimulate entrepreneurship and development across all African countries. Particularly in contexts where new firms predominantly emerge out of necessity, directing remittances towards this end, with the overarching aim of fostering growth, may prove ineffective. Under such circumstances, policy initiatives should instead focus on promoting physical and human capital accumulation, enhancing living standards, and improving institutional quality as essential prerequisites for sustainable development.

An additional policy implication derived from our findings is the divergent roles of internal funding sources observed among the former UK and French colonies. Notably, private savings constitute the sole internal financing source for new businesses established out of necessity. At the same time, the credit channel appears to fund ventures created to capitalize on economic opportunities predominantly. Both scenarios underscore the imperative of fostering financial development to finance entrepreneurship and, concurrently, encourage the productive utilization of private savings. Savings represent the foundational resource for driving financial intermediation, which remains underdeveloped in many African countries (Omoruyi et al. 2017).

At the international level, the policy implications are contingent upon the finding that remittances stimulate the creation of new firms, while foreign aid and foreign direct investment may mitigate it. It is well-documented that African countries receive remittances from the diaspora, primarily residing in developed countries, which are also the primary sources of foreign direct investment and foreign aid. Notably, in these countries, public sentiment often exhibits hostility towards migrants, advocating for more stringent immigration policies to "*help them in their countries.*" This sentiment strongly favors the aid and foreign investment framework over remittances, as the latter necessitates acceptance of migrants and a willingness to accommodate increasing inflows of foreigners. However, if the objective is to stimulate local entrepreneurship for job creation and economic growth, our findings indicate that remittances are effective, whereas foreign aid and foreign direct investment are not. This outcome suggests a paradigm shift in the perception of migration, evolving it into a mutually beneficial arrangement between sending and hosting countries. Besides benefiting from the positive impacts associated with the influx of a new workforce, hosting countries facilitate the creation of conducive conditions for virtuous and autonomous developmental trajectories in sending countries. In their countries of origin, migrants contribute to the flow of remittances, which can catalyze the establishment of new ventures, thereby fostering job creation, enhancing employment rates, and ultimately fostering economic expansion. Consequently, the migratory pressures, particularly among the youth, to leave Africa would be alleviated.



As a result, if public sentiment in host countries aligns with the assertion of "*help them in their countries*," migrants ought to be embraced, as their remittance contributions today translate into diminished migratory pressures in the future. This stance would entail less stringent visa regulations in hosting nations, accompanied by economic and social integration policies. For host countries, a viable strategy could involve fostering immigrant entrepreneurship (Rath and Swagerman 2016). Such a policy benefits both the receiving and sending countries, as migrants would provide financial remittances and transfer entrepreneurial skills and knowledge to their home communities (Bettin et al. 2024).

### 5.3 Limitations and future recommendations

While this study unveils compelling findings, it also encounters some limitations. Firstly, the results are based on macro-data, which provide observable and comparable statistics across nations and timeframes. Nevertheless, it is worth noting that entrepreneurship research is progressively utilizing microdata, which offers detailed information conducive to more targeted analyses. This limitation indicates a promising direction for future research, including investigating the differential impact of various funding sources on enterprises stratified by size and examining how the utilization of diverse funding sources varies according to the gender, age, and educational attainment of entrepreneurs. An additional limitation concerns omitting certain variables relevant to entrepreneurship in Africa. Specifically, as Omoruyi et al. (2017) underscored, factors such as entrepreneurial education, transportation infrastructure, and access to electricity pose significant challenges for entrepreneurship on the continent. Furthermore, it would have been beneficial to incorporate additional financial development indicators beyond domestic credit. Nonetheless, it is crucial to emphasize that excluding certain variables from the analysis stems from the unavailability of reliable data rather than a deliberate omission by the researchers.

## Appendix A

Robustness checks.

See Tables 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25 and 26

**Table 15** Total sample with interaction effects between external sources: random-effects estimates

	(1)	(2)	(3)
REM	2.136*** (0.698)	2.183*** (0.736)	
AID	0.584 (0.800)		0.420 (0.816)
FDI		-0.038 (0.342)	0.282 (0.398)
REM*AID	-12.672*** (4.089)		
REM*FDI		-9.184*** (3.321)	
AID*FDI			-7.778*** (2.906)
GDPPCGR	0.002 (0.005)	0.006 (0.005)	0.005 (0.005)
GDPPC	-0.167** (0.081)	-0.100 (0.085)	-0.107 (0.076)
TRADE	0.008*** (0.002)	0.009*** (0.002)	0.008*** (0.002)
EMPAGR	0.013 (0.010)	0.017* (0.010)	0.016* (0.010)
EMPIND	0.102*** (0.020)	0.100*** (0.021)	0.105*** (0.021)
INFLATION	-0.001 (0.001)	-0.001 (0.001)	-0.001 (0.001)
MIMIC	0.056*** (0.021)	0.061*** (0.021)	0.059*** (0.021)
GOVCONS	-0.827 (0.866)	-0.897 (0.873)	-1.094 (0.878)
GOVEFF	0.585*** (0.165)	0.709*** (0.167)	0.651*** (0.168)
PERTIME	-0.003*** (0.000)	-0.004*** (0.000)	-0.003*** (0.000)
EDB	0.007*** (0.003)	0.006** (0.003)	0.007*** (0.003)
Observations	355	355	355
LR test ( <i>p</i> -value)	(0.000)	(0.000)	(0.000)
Pseudo R-sq	35	35	35

Robust standard errors in brackets. Regressions include country random effects and time-fixed effects. The STATA command `menbreg` has been used. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ . LR test (*p*-value) is the probability of a  $\chi^2$  test on the null hypothesis that the log of the dispersion parameter is zero, in which case a Poisson model would be appropriate

**Table 16** Total sample with interaction effects between external and internal sources: random-effects estimates

	(1)	(2)	(3)	(4)	(5)	(6)
REM	2.426** (1.122)			1.457** (0.683)		
AID		0.304 (1.018)			-1.834** (0.855)	
FDI			-0.238 (0.461)			-0.734 (0.540)
CREDIT	0.007* (0.004)	0.008** (0.004)	0.006 (0.004)			
SAVINGS				0.005 (0.005)	0.002 (0.005)	0.004 (0.004)
REM*CREDIT	-0.007 (0.016)					
CREDIT*AID		-0.035* (0.018)				
CREDIT*FDI			-0.014 (0.009)			
REM*SAVINGS				-0.005 (0.030)		
SAVINGS*AID					0.019 (0.038)	
SAVINGS*FDI						0.007 (0.015)
GDPPCGR	0.009* (0.005)	0.006 (0.005)	0.009* (0.005)	0.003 (0.005)	0.002 (0.005)	0.005 (0.005)
GDPPC	-0.248*** (0.084)	-0.148* (0.076)	-0.105 (0.078)	-0.205** (0.084)	-0.137* (0.078)	-0.130* (0.078)
TRADE	0.008*** (0.002)	0.007*** (0.002)	0.009*** (0.002)	0.010*** (0.002)	0.009*** (0.002)	0.009*** (0.002)
EMPAGR	0.007 (0.012)	0.004 (0.012)	0.007 (0.012)	0.011 (0.011)	0.009 (0.011)	0.010 (0.011)
EMPIND	0.087*** (0.024)	0.083*** (0.023)	0.084*** (0.023)	0.101*** (0.021)	0.096*** (0.021)	0.093*** (0.021)
INFLATION	0.002 (0.001)	0.002 (0.001)	0.002 (0.001)	-0.001 (0.001)	-0.001 (0.001)	-0.001 (0.001)
MIMIC	0.075*** (0.021)	0.079*** (0.020)	0.083*** (0.020)	0.064*** (0.021)	0.069*** (0.021)	0.068*** (0.021)
GOVCONS	-1.675* (0.918)	-2.023** (0.928)	-1.916** (0.931)	-0.639 (0.876)	-1.055 (0.885)	-0.838 (0.894)
GOVEFF	0.833*** (0.164)	0.788*** (0.167)	0.998*** (0.168)	0.729*** (0.169)	0.717*** (0.168)	0.832*** (0.170)
PERTIME	-0.002*** (0.001)	-0.002*** (0.000)	-0.002*** (0.000)	-0.003*** (0.001)	-0.003*** (0.000)	-0.003*** (0.000)
EDB	0.006** (0.003)	0.007*** (0.003)	0.007*** (0.003)	0.006** (0.003)	0.006** (0.003)	0.006** (0.003)

**Table 16** (continued)

	(1)	(2)	(3)	(4)	(5)	(6)
Observations	323	323	323	351	351	351
LR test ( <i>p</i> -value)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Pseudo R-sq	34	34	34	35	35	35

See Table 15

**Table 17** Sub-sample of former UK colonies with interaction effects between external sources: random-effects estimates

	(1)	(2)	(3)
REM	2.480*** (0.793)	0.597 (0.840)	
AID	0.376 (0.736)		- 3.163*** (1.210)
FDI		- 0.117 (0.402)	- 1.094* (0.605)
REM*AID	- 17.539*** (5.539)		
REM*FDI		0.830 (4.951)	
AID*FDI			11.146** (5.111)
GDPPCGR	- 0.003 (0.005)	- 0.000 (0.005)	- 0.002 (0.005)
GDPPC	- 0.034 (0.088)	0.033 (0.100)	0.115 (0.080)
TRADE	0.010*** (0.002)	0.010*** (0.002)	0.009*** (0.002)
EMPAGR	0.043*** (0.010)	0.048*** (0.010)	0.048*** (0.010)
EMPIND	0.162*** (0.024)	0.175*** (0.025)	0.170*** (0.024)
INFLATION	- 0.001 (0.001)	- 0.001 (0.001)	- 0.000 (0.001)
MIMIC	0.020 (0.029)	0.010 (0.030)	0.021 (0.029)
GOVCONS	- 0.830 (0.936)	- 0.191 (0.974)	- 0.988 (0.978)
GOVEFF	0.333 (0.218)	0.236 (0.231)	0.299 (0.218)
PERTIME	- 0.004*** (0.001)	- 0.003*** (0.001)	- 0.003*** (0.000)
EDB	0.002 (0.005)	0.005 (0.005)	0.006 (0.005)
Observations	165	165	165
LR test ( <i>p</i> -value)	(0.000)	(0.000)	(0.000)
Pseudo R-sq	14	14	14

See Table 15

**Table 18** Sub-sample of former UK colonies with interaction effects between external and internal sources: random-effects estimates

	(1)	(2)	(3)	(4)	(5)	(6)
REM	2.448** (0.990)			0.685 (0.636)		
AID		-0.285 (0.858)			-3.252*** (0.860)	
FDI			0.866 (0.725)			0.174 (0.561)
CREDIT	0.010** (0.004)	0.006 (0.004)	0.009** (0.004)			
SAVINGS				-0.002 (0.005)	-0.012** (0.005)	0.001 (0.005)
REM*CREDIT	-0.010 (0.014)					
CREDIT*AID		-0.008 (0.016)				
CREDIT*FDI			-0.020** (0.009)			
REM*SAVINGS				0.010 (0.032)		
SAVINGS*AID					0.123*** (0.034)	
SAVINGS*FDI						-0.026 (0.029)
GDPCCGR	0.002 (0.005)	-0.002 (0.006)	-0.002 (0.005)	-0.000 (0.006)	-0.000 (0.005)	0.000 (0.006)
GDPPC	-0.031 (0.089)	0.100 (0.082)	0.148* (0.082)	0.038 (0.098)	0.013 (0.085)	0.102 (0.088)
TRADE	0.009*** (0.002)	0.009*** (0.002)	0.009*** (0.002)	0.009*** (0.002)	0.009*** (0.002)	0.009*** (0.002)
EMPAGR	0.061*** (0.013)	0.059*** (0.013)	0.064*** (0.013)	0.052*** (0.012)	0.047*** (0.011)	0.052*** (0.012)
EMPIND	0.191*** (0.030)	0.197*** (0.029)	0.208*** (0.028)	0.178*** (0.025)	0.162*** (0.024)	0.176*** (0.025)
INFLATION	0.003*** (0.001)	0.002** (0.001)	0.002** (0.001)	-0.001 (0.001)	-0.000 (0.001)	-0.001 (0.001)
MIMIC	0.032 (0.027)	0.045 (0.028)	0.043 (0.028)	0.007 (0.031)	0.013 (0.030)	0.015 (0.031)
GOVCONS	-0.473 (0.955)	-0.722 (1.022)	-0.204 (0.969)	-0.223 (0.969)	-0.991 (0.954)	-0.694 (1.013)
GOVEFF	0.052 (0.207)	0.212 (0.210)	0.242 (0.207)	0.224 (0.249)	0.435* (0.229)	0.224 (0.235)
PERTIME	-0.002*** (0.000)	-0.002*** (0.001)	-0.002*** (0.001)	-0.003*** (0.001)	-0.004*** (0.001)	-0.003*** (0.001)
EDB	0.000 (0.005)	0.003 (0.005)	0.002 (0.005)	0.005 (0.005)	0.005 (0.005)	0.006 (0.005)

**Table 18** (continued)

	(1)	(2)	(3)	(4)	(5)	(6)
Observations	143	143	143	161	161	161
LR test ( $p$ -value)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Pseudo R-sq	14	14	14	14	14	14

See Table 15

**Table 19** Sub-sample of former French colonies with interaction effects between external sources: random-effects estimates

	(1)	(2)	(3)
REM	1.031 (2.466)	1.643 (2.171)	
AID	3.367 (2.782)		4.504* (2.367)
FDI		-0.354 (0.533)	0.229 (0.877)
REM*AID	-0.979 (21.814)		
REM*FDI		-5.725 (9.815)	
AID*FDI			-16.510 (16.298)
GDPPCGR	0.014* (0.008)	0.019** (0.008)	0.013 (0.008)
GDPPC	-0.103 (0.146)	-0.119 (0.141)	-0.115 (0.146)
TRADE	0.006* (0.003)	0.007** (0.003)	0.006** (0.003)
EMPAGR	-0.017 (0.020)	-0.017 (0.020)	-0.020 (0.020)
EMPIND	0.022 (0.034)	0.023 (0.035)	0.021 (0.034)
INFLATION	0.004 (0.005)	0.004 (0.006)	0.005 (0.005)
MIMIC	0.049 (0.030)	0.064** (0.028)	0.045 (0.029)
GOVCONS	-0.290 (1.485)	0.030 (1.470)	-0.642 (1.477)
GOVEFF	0.714*** (0.257)	0.803*** (0.276)	0.803*** (0.263)
PERTIME	-0.002** (0.001)	-0.002** (0.001)	-0.002** (0.001)
EDB	0.009*** (0.003)	0.009** (0.003)	0.009*** (0.003)
Observations	154	154	154
LR test ( $p$ -value)	(0.000)	(0.000)	(0.000)
Pseudo R-sq	17	17	17

See Table 15

**Table 20** Sub-sample of former French colonies with interaction effects between external and internal sources: random-effects estimates

	(1)	(2)	(3)	(4)	(5)	(6)
REM	-2.192 (3.009)			2.827 (2.858)		
AID		5.614* (3.313)			8.888*** (2.334)	
FDI			-0.116 (0.726)			-1.620 (1.393)
CREDIT	0.015 (0.011)	0.019** (0.008)	0.015** (0.007)			
SAVINGS				0.015 (0.010)	0.035*** (0.010)	0.009 (0.009)
REM*CREDIT	0.023 (0.060)					
CREDIT*AID		-0.064 (0.078)				
CREDIT*FDI			-0.027 (0.031)			
REM*SAVINGS				-0.031 (0.084)		
SAVINGS*AID					-0.447*** (0.110)	
SAVINGS*FDI						0.025 (0.030)
GDPPCGR	0.020** (0.008)	0.015* (0.008)	0.020*** (0.008)	0.017** (0.008)	0.010 (0.007)	0.018** (0.008)
GDPPC	-0.003 (0.124)	0.043 (0.134)	0.004 (0.124)	-0.173 (0.145)	-0.249 (0.152)	-0.155 (0.141)
TRADE	0.006* (0.003)	0.005 (0.003)	0.006** (0.003)	0.004 (0.003)	0.002 (0.003)	0.006 (0.004)
EMPAGR	-0.009 (0.019)	-0.007 (0.019)	-0.007 (0.018)	-0.010 (0.020)	-0.012 (0.020)	-0.015 (0.020)
EMPIND	0.025 (0.033)	0.024 (0.033)	0.023 (0.033)	0.033 (0.035)	0.046 (0.033)	0.026 (0.035)
INFLATION	0.007 (0.006)	0.007 (0.006)	0.006 (0.006)	0.001 (0.006)	0.001 (0.005)	0.001 (0.006)
MIMIC	0.058** (0.027)	0.043 (0.029)	0.058** (0.026)	0.070** (0.029)	0.049* (0.029)	0.062** (0.029)
GOVCONS	0.059 (1.483)	-0.211 (1.465)	0.237 (1.468)	0.182 (1.468)	-1.552 (1.422)	0.372 (1.554)
GOVEFF	0.819*** (0.266)	0.826*** (0.263)	0.966*** (0.277)	0.650** (0.264)	0.758*** (0.246)	0.750*** (0.276)

**Table 20** (continued)

	(1)	(2)	(3)	(4)	(5)	(6)
PERTIME	-0.001*	-0.002**	-0.001	-0.002**	-0.002***	-0.002**
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
EDB	0.008**	0.009**	0.008**	0.006	0.004	0.007*
	(0.003)	(0.003)	(0.003)	(0.004)	(0.004)	(0.004)
Observations	148	148	148	154	154	154
LR test ( <i>p</i> -value)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Pseudo R-sq	17	17	17	17	17	17

See Table 15



**Table 21** Total sample with interaction effects between external sources: population-weighted estimates

	(1)	(2)	(3)
REM	2.699*** (0.646)	2.701*** (0.835)	
AID	0.649 (0.750)		0.769 (1.027)
FDI		-0.018 (0.336)	0.411 (0.375)
REM*AID	-12.668*** (3.431)		
REM*FDI		-8.129** (3.676)	
AID*FDI			-9.159*** (3.468)
GDPPCGR	0.003 (0.007)	0.007 (0.006)	0.006 (0.006)
GDPPC	-0.207** (0.091)	-0.141 (0.092)	-0.112 (0.079)
TRADE	0.009*** (0.002)	0.010*** (0.002)	0.009*** (0.002)
EMPAGR	0.019** (0.009)	0.022** (0.010)	0.022** (0.010)
EMPIND	0.107*** (0.022)	0.106*** (0.022)	0.110*** (0.022)
INFLATION	-0.001 (0.001)	-0.001 (0.001)	-0.001 (0.001)
MIMIC	0.062*** (0.022)	0.067*** (0.021)	0.066*** (0.023)
GOVCONS	-0.598 (1.162)	-0.618 (1.171)	-0.874 (1.179)
GOVEFF	0.500*** (0.180)	0.618*** (0.181)	0.568*** (0.189)
PERTIME	-0.004*** (0.001)	-0.004*** (0.001)	-0.003*** (0.001)
EDB	0.006** (0.002)	0.005** (0.003)	0.006*** (0.002)
Observations	355	355	355
LR test ( <i>p</i> -value)	(0.000)	(0.000)	(0.000)
Pseudo R-sq	0.168	0.167	0.167

Robust standard errors in brackets. Regressions include country and time fixed effects. The option “exposure” of the STATA command nbreg has been used to weight observations depending on country population. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ . LR test (*p*-value) is the probability of a  $\chi^2$  test on the null hypothesis that the log of the dispersion parameter is zero, in which case a Poisson model would be appropriate

**Table 22** Total sample with interaction effects between external and internal sources: population-weighted estimates

	(1)	(2)	(3)	(4)	(5)	(6)
REM	2.358*			2.032***		
	(1.221)			(0.725)		
AID		0.178			-1.648**	
		(1.126)			(0.837)	
FDI			-0.326			-0.649
			(0.499)			(0.509)
CREDIT	0.005	0.006	0.004			
	(0.004)	(0.004)	(0.004)			
SAVINGS				0.003	0.003	0.004
				(0.005)	(0.005)	(0.004)
REM*CREDIT	0.007					
	(0.018)					
CREDIT*AID		-0.032*				
		(0.019)				
CREDIT*FDI			-0.011			
			(0.008)			
REM*SAVINGS				0.003		
				(0.028)		
SAVINGS*AID					0.010	
					(0.040)	
SAVINGS*FDI						0.005
						(0.015)
GDPPCGR	0.009*	0.006	0.008	0.004	0.003	0.005
	(0.005)	(0.006)	(0.006)	(0.007)	(0.007)	(0.007)
GDPPC	-0.314***	-0.154*	-0.110	-0.247***	-0.133*	-0.131
	(0.098)	(0.087)	(0.081)	(0.090)	(0.080)	(0.080)
TRADE	0.009***	0.008***	0.009***	0.010***	0.009***	0.010***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
EMPAGR	0.012	0.005	0.009	0.015	0.012	0.013
	(0.015)	(0.015)	(0.015)	(0.012)	(0.011)	(0.012)
EMPIND	0.092***	0.083***	0.086***	0.106***	0.101***	0.097***
	(0.029)	(0.028)	(0.028)	(0.024)	(0.023)	(0.024)
INFLATION	0.002**	0.002	0.002	-0.001	-0.001	-0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
MIMIC	0.081***	0.093***	0.096***	0.070***	0.083***	0.079***
	(0.023)	(0.025)	(0.025)	(0.023)	(0.024)	(0.024)
GOVCONS	-1.485	-1.849	-1.677	-0.438	-0.956	-0.692
	(1.227)	(1.308)	(1.272)	(1.184)	(1.213)	(1.242)
GOVEFF	0.780***	0.736***	0.943***	0.656***	0.651***	0.766***
	(0.183)	(0.184)	(0.191)	(0.179)	(0.189)	(0.193)

**Table 22** (continued)

	(1)	(2)	(3)	(4)	(5)	(6)
PERTIME	-0.002*** (0.001)	-0.002*** (0.001)	-0.002*** (0.001)	-0.004*** (0.001)	-0.003*** (0.001)	-0.003*** (0.001)
EDB	0.005* (0.002)	0.006** (0.003)	0.006** (0.002)	0.004* (0.003)	0.005** (0.003)	0.005** (0.003)
Observations	323	323	323	351	351	351
LR test ( <i>p</i> -value)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Pseudo R-sq	0.175	0.174	0.173	0.166	0.166	0.165

See Table 21

**Table 23** Sub-sample of former UK colonies with interaction effects between external sources: population-weighted estimates

	(1)	(2)	(3)
REM	2.498** (0.979)	0.655 (1.021)	
AID	0.445 (0.594)		-2.575** (1.080)
FDI		-0.140 (0.421)	-0.962* (0.583)
REM*AID	-16.642*** (6.316)		
REM*FDI		1.061 (5.055)	
AID*FDI			9.258** (4.670)
GDPPCGR	-0.003 (0.010)	-0.002 (0.009)	-0.003 (0.010)
GDPPC	0.030 (0.133)	0.104 (0.116)	0.196* (0.105)
TRADE	0.010*** (0.003)	0.010*** (0.003)	0.009*** (0.003)
EMPAGR	0.046*** (0.009)	0.052*** (0.010)	0.052*** (0.009)
EMPIND	0.159*** (0.030)	0.172*** (0.032)	0.168*** (0.030)
INFLATION	-0.001 (0.001)	-0.001 (0.001)	-0.000 (0.001)
MIMIC	0.010 (0.033)	-0.011 (0.033)	0.002 (0.032)
GOVCONS	-0.499 (1.139)	0.240 (1.019)	-0.469 (1.035)
GOVEFF	0.236 (0.280)	0.129 (0.270)	0.194 (0.274)
PERTIME	-0.004*** (0.001)	-0.003*** (0.001)	-0.003*** (0.001)
EDB	0.001 (0.005)	0.004 (0.005)	0.005 (0.004)
Observations	165	165	165
LR test ( <i>p</i> -value)	(0.000)	(0.000)	(0.000)
Pseudo R-sq	0.181	0.177	0.178

See Table 21

**Table 24** Sub-sample of former UK colonies with interaction effects between external and internal sources population-weighted estimates

	(1)	(2)	(3)	(4)	(5)	(6)
REM	2.002 (1.273)			0.804 (0.685)		
AID		-0.475 (0.579)			-3.091*** (0.711)	
FDI			0.862 (0.609)			0.150 (0.548)
CREDIT	0.009** (0.004)	0.005 (0.005)	0.008** (0.004)			
SAVINGS				-0.005 (0.007)	-0.013** (0.006)	-0.000 (0.005)
REM*CREDIT	-0.001 (0.013)					
CREDIT*AID		-0.001 (0.014)				
CREDIT*FDI			-0.020*** (0.007)			
REM*SAVINGS				0.028 (0.035)		
SAVINGS*AID					0.123*** (0.030)	
SAVINGS*FDI						-0.024 (0.028)
GDPPCGR	0.000 (0.005)	-0.004 (0.005)	-0.004 (0.005)	-0.001 (0.010)	-0.001 (0.010)	-0.001 (0.010)
GDPPC	0.024 (0.112)	0.186* (0.095)	0.234** (0.092)	0.081 (0.125)	0.079 (0.111)	0.173 (0.109)
TRADE	0.010*** (0.002)	0.010*** (0.002)	0.010*** (0.002)	0.010*** (0.003)	0.009*** (0.003)	0.009*** (0.003)
EMPAGR	0.066*** (0.014)	0.063*** (0.014)	0.067*** (0.013)	0.056*** (0.011)	0.049*** (0.010)	0.054*** (0.011)
EMPIND	0.197*** (0.040)	0.200*** (0.038)	0.211*** (0.038)	0.174*** (0.031)	0.156*** (0.030)	0.171*** (0.031)
INFLATION	0.003*** (0.001)	0.002* (0.001)	0.002** (0.001)	-0.000 (0.001)	-0.000 (0.001)	-0.000 (0.001)
MIMIC	0.030 (0.034)	0.039 (0.040)	0.035 (0.035)	-0.016 (0.037)	-0.007 (0.034)	-0.008 (0.036)
GOVCONS	-0.162 (1.050)	-0.273 (1.382)	0.182 (1.106)	0.198 (1.018)	-0.582 (1.020)	-0.282 (1.134)
GOVEFF	0.016 (0.200)	0.144 (0.193)	0.173 (0.194)	0.173 (0.262)	0.349 (0.277)	0.135 (0.295)

**Table 24** (continued)

	(1)	(2)	(3)	(4)	(5)	(6)
PERTIME	-0.002*** (0.001)	-0.002*** (0.000)	-0.002*** (0.000)	-0.003*** (0.001)	-0.004*** (0.001)	-0.003*** (0.001)
EDB	-0.001 (0.005)	0.001 (0.006)	0.000 (0.005)	0.003 (0.005)	0.004 (0.005)	0.005 (0.005)
Observations	143	143	143	161	161	161
LR test ( <i>p</i> -value)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Pseudo R-sq	0.195	0.192	0.193	0.177	0.181	0.177

See Table 21

**Table 25** Sub-sample of former French colonies with interaction effects between external sources: population-weighted estimates

	(1)	(2)	(3)
REM	-0.359 (2.323)	1.212 (2.338)	
AID	2.786 (4.714)		6.017 (4.095)
FDI		-0.377 (0.616)	0.535 (0.937)
REM*AID	16.119 (25.979)		
REM*FDI		-6.879 (7.665)	
AID*FDI			-25.096 (18.352)
GDPPCGR	0.015** (0.007)	0.020*** (0.005)	0.012* (0.006)
GDPPC	-0.336 (0.212)	-0.337 (0.220)	-0.392* (0.233)
TRADE	0.005** (0.002)	0.005** (0.002)	0.005** (0.002)
EMPAGR	-0.020 (0.026)	-0.025 (0.027)	-0.022 (0.028)
EMPIND	0.027 (0.035)	0.021 (0.043)	0.027 (0.038)
INFLATION	0.005 (0.005)	0.006 (0.005)	0.006 (0.005)
MIMIC	0.046 (0.041)	0.067* (0.036)	0.025 (0.042)
GOVCONS	-0.009 (1.657)	0.058 (1.604)	-0.400 (1.569)
GOVEFF	0.520** (0.244)	0.612** (0.267)	0.611** (0.288)
PERTIME	-0.003*** (0.001)	-0.002*** (0.001)	-0.003*** (0.001)
EDB	0.006* (0.003)	0.005 (0.003)	0.005 (0.003)
Observations	154	154	154
LR test ( <i>p</i> -value)	(0.000)	(0.000)	(0.000)
Pseudo R-sq	0.151	0.151	0.153

See Table 21

**Table 26** Sub-sample of former French colonies with interaction effects between external and internal sources: population-weighted estimates

	(1)	(2)	(3)	(4)	(5)	(6)
REM	0.376 (3.691)			4.702 (3.110)		
AID		8.372 (6.883)			10.601*** (2.966)	
FDI			0.024 (0.792)			-1.505 (1.013)
CREDIT	0.010 (0.012)	0.019 (0.012)	0.004 (0.008)			
SAVINGS				0.020** (0.008)	0.039*** (0.011)	0.012 (0.008)
REM*CREDIT	-0.020 (0.059)					
CREDIT*AID		-0.107 (0.110)				
CREDIT*FDI			-0.035 (0.026)			
REM*SAVINGS				-0.130* (0.074)		
SAVINGS*AID					-0.543*** (0.139)	
SAVINGS*FDI						0.021 (0.026)
GDPPCGR	0.020*** (0.006)	0.012* (0.007)	0.021*** (0.005)	0.018*** (0.005)	0.009* (0.005)	0.020*** (0.005)
GDPPC	-0.097 (0.245)	0.086 (0.246)	-0.178 (0.241)	-0.407* (0.228)	-0.533** (0.221)	-0.362 (0.222)
TRADE	0.004* (0.002)	0.004* (0.002)	0.005** (0.002)	0.002 (0.002)	0.001 (0.002)	0.003 (0.003)
EMPAGR	-0.028 (0.029)	-0.035 (0.028)	-0.025 (0.030)	-0.002 (0.031)	-0.002 (0.028)	-0.013 (0.034)
EMPIND	0.020 (0.042)	0.018 (0.037)	0.014 (0.043)	0.046 (0.039)	0.069** (0.034)	0.024 (0.047)
INFLATION	0.007 (0.006)	0.006 (0.005)	0.006 (0.006)	0.001 (0.005)	0.002 (0.005)	0.002 (0.005)
MIMIC	0.079* (0.041)	0.054 (0.042)	0.078** (0.038)	0.073** (0.033)	0.020 (0.035)	0.066* (0.034)
GOVCONS	-0.044 (1.845)	-0.665 (1.646)	0.016 (1.680)	0.353 (1.719)	-1.046 (1.368)	0.530 (1.862)
GOVEFF	0.473* (0.251)	0.558** (0.277)	0.691** (0.295)	0.532** (0.260)	0.559** (0.237)	0.551** (0.265)



**Table 26** (continued)

	(1)	(2)	(3)	(4)	(5)	(6)
PERTIME	−0.002*** (0.001)	−0.002*** (0.001)	−0.002*** (0.001)	−0.003*** (0.001)	−0.003*** (0.001)	−0.002*** (0.001)
EDB	0.006* (0.003)	0.007** (0.003)	0.005* (0.003)	0.002 (0.003)	−0.000 (0.003)	0.004 (0.003)
Observations	148	148	148	154	154	154
LR test ( <i>p</i> -value)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Pseudo R-sq	0.150	0.152	0.151	0.151	0.160	0.151

See Table 21

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**Data availability** Data for this study will be made available upon a reasonable request.

## Declarations

**Conflict of interest** The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

**Ethical approval** We confirm that the manuscript has been read and approved by all named authors and that there are no other persons who satisfied the criteria for authorship but are not listed. We further confirm that the order of authors listed in the manuscript has been approved by all the authors.

**Informed consent** We confirm that this research does not involve humans and/or animal's informed consent; further, this research does not involve human participants and also does not relate to the welfare of animals if the research involves animals.

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