The Economic and Labour Relations Review (2024), **35**, 103–117
doi:10.1017/elr.2024.11

CAMBRIDGE UNIVERSITY PRESS

ORIGINAL ARTICLE

Keynes' Finance Circuit model on banks in Africa

Jacob Tche

Economics and Management, University of Yaounde II, Cameroon
Email: jacobtche1985@gmail.com

(Received 27 April 2023; revised 17 January 2024; accepted 5 February 2024; first published online 13 March 2024)

Abstract

Since the publication of Keynes General Theory in 1936 when Keynes developed an original Finance Circuit model which was subsequently enriched by the post-Keynesian theory of endogenous money supply, no study has undertaken Keynes Finance Circuit model complete causality tests. The present paper breaks new ground and aims at filling the above lacuna by employing Granger non-causality test for heterogeneous panel data models to investigate the above model based on a sample of 32 African countries, for the period from 1990 to 2021. Our results lend support to the complete Keynes Finance Circuit model in the short run. In the long run, all causalities are vindicated except the causal relationship running from economic growth to savings which appears insignificant. In terms of policy implication, we are encouraging policymakers to design policies that will stimulate economic growth within a post-Keynesian endogenous money supply framework.

Keywords: Africa; Banks; economic growth; effective demand; Keynesian; panel data models; post-Keynesian

Introduction

Keynes (1936, 1937) developed a Finance Circuit where economic activity expansion stimulates demand for bank loans. Banks will then react to the latter demand by supplying the desired loans which will stimulate investment and economic growth. Since savings are an allocation of current income, savings and income will be generated only when production has started. The association between investment and savings in Keynes Finance Circuit is explained by the expenditure multiplier as a mechanism which brings savings and investment into equality.

Conversely, post-Keynesian economists, such as Robinson (1956), Kaldor (1970), Moore (1988), and Lavoie (1992), enhanced Keynes' Finance Circuit by employing the theory of endogenous money supply which holds that money supply is endogenously determined by the demand for credit. Therefore, money supply is credit-driven and demand-determined. For example, Robinson (1956) placed commercial banks and bank credit at the heart of her theory of endogenous money supply. She argued that, as the economy expands, banks lend more money to meet the increasing investment needs of the system. When a firm gets credit, money is created by the bank making the payment, which stimulates investment and economic growth.

The central role placed on banks in Keynesian and post-Keynesian theoretical frameworks is relevant in an African context today, since banks are closely involved with industrial firms and have a relatively low importance and degree of development of African capital markets. According to Arestis et al (2003), African countries have a small number of banks involved in long-run investment financing and rely on non-market

arrangements in their financial institutions. Companies are owned by small shareholders with large share stakes, and control is retained within the corporate sector. Management is accountable, and removed or changed when it is proven to underperform without the heavy cost and trauma of hostile takeovers. Banks in these systems continue to operate despite the emergence of globalisation and financial liberalisation. Arestis et al (2003) went on to say that companies rely heavily on bank loans and banks play a key role in growth and development. Unlike capital-market-based financial systems, such as those in the United Kingdom and United States of America characterised by highly developed capital markets and banks with low involvement in fund allocation or asset ownership, African countries are today more suitable for the investigation of Keynes Finance Circuit model.

Since the publication of Keynes General Theory in 1936, no study has specifically undertaken the model complete causality tests. The present paper breaks new ground and aims at filling the above lacuna. Furthermore, the causal relationships between variables of the Finance Circuit model are controversial issues reflected in conflicting econometric tests results reviewed in Section 2 of the present paper. This article, therefore, endeavours to contribute to the existing literature by testing the Finance Circuit model robustness in African countries.

The remaining sections of the article are structured as follows: Section 1 reviews Keynesian and post-Keynesian theoretical framework related to the Finance Circuit model. Section 2 undertakes the review of econometric tests on Keynes Finance Circuit model. Section 3 discusses econometric test results and Section 4 concludes.

Theoretical review of literature

Keynes' Finance Circuit model

Although Keynes (1936, 1937) seemed to have taken for granted the financing of investment in his *General Theory*, he pointed out that the entrepreneur may obtain short-run bank loans to finance the net increment expenditure (Keynes 1973, 217). Commercial banks create money every time they increase the aggregate volume of bank loans outstanding in the economy. In the short run, no real resources are involved: no savings in particular take place or have any role in this operation as indicated in the Finance Circuit illustration below. Finance precedes the actual purchase or even the actual production of the investment goods that will be demanded. Investment good producers observe bank credit creation to form their short-run expectations so that more production will only continue after finance has been obtained. Since savings are an allocation of current income, savings and income will be generated only when production has started. Keynes emphasised the role of finance in investment decisions and even provided a definition of finance:

> *In what follows I use the term finance to mean the credit required in the interval between planning and execution . . . .Surely nothing is more certain than that the credit or finance required by ex-ante investment is not mainly supplied by ex-ante saving* (Keynes 1973, 216–217)

It should be noted that according to Keynes, the Finance Circuit does not begin with money creation but rather commences with the expansion of economic activity which stimulates demand for bank loans. Keynes stressed that demand for finance is associated with activity levels expansion rather than investment (Keynes 1973, 233). Consequently, investment finance is 'only a special case of the finance required by any productive process' (Keynes 1973, 208). Keynes likely regards production decisions either of capital or of consumption goods as taken in advance based on orders or of expected demand for bank loans. Only if

https://doi.org/10.1017/elr.2024.11 Published online by Cambridge University Press

investment or production are increasing, 'extra finance involved will constitute an additional demand for money' (Keynes 1973, 209).

The second point asserted by Keynes is the ability of the entrepreneur to fund the short-run obligations by long-run issues. This point suggests that if money creation is the effective condition for starting the process of investment, it is not all that is required to sustain it. Unlike Kalecki's model (1935) where funding is derived from short-run bank loans and not via long-run bonds and securities, according to Keynes, the firm will be expected to pay back the bank loan by subsequent long-run issues. In this case, the bank will have the liquidity of its balance sheet restored and the firm will have assets and liabilities of comparable maturity.

Keynes, therefore, developed an original sequential process, in which one starts with economic expansion which leads to banks creating finance, and the investment being made creating equivalent savings. The association between investment and savings in Keynes' prior investment approach is explained by the expenditure multiplier. Keynes (1936, 115) asserted that, 'Let us call k the investment multiplier. It tells us that, when there is an increment of aggregate investment, income will increase by an amount which is k times the increment of investment'. An increase in investment, therefore, raises income through the multiplier until an equivalent amount of savings is generated. Investment can be constrained through shortage of credit rather than a shortage of savings (Keynes 1937, 222).

Keynes Finance Circuit can, therefore, be illustrated as follows:

Bank loans → Investment → Economic Growth → Savings → Investment (→ stands for a causal relationship).

In the next subsection, we demonstrate that Keynes Finance Circuit has been adopted and consolidated in post-Keynesian paradigms in which the central thesis is that money supply is endogenously determined by the demand for credit as the economy expands.

Post-Keynesian economists on Keynes' Financial Circuit model

According to the Post-Keynesian Economics Society (2024), post-Keynesian economics is a school of economic thought that has its origins in models linked to John Maynard Keynes and Michal Kalecki (see also King 2013). For Bougrine and Rochon (2020), post-Keynesian economics is a theoretical framework that draws its inspiration from the contributions of John Maynard Keynes, as well as other prominent economists such as Michal Kalecki, Joan Robinson, Nicholas Kaldor, and various Cambridge economists. This school of thought emphasises the significance of money in comprehending economic activity. It is therefore not surprising that the post-Keynesian school has remained closest to the spirit of Keynes by adopting and consolidating Keynes' Finance Circuit. More importantly, banks play a central role in post-Keynesian paradigms related to investment approaches which advocate that entrepreneurs need banking services such as credit which will stimulate investment and boost economic growth as indicated in Keynes Finance Circuit. However, endogenous money supply is a major component of post-Keynesian macroeconomics. It is a tradition that began in the post-Keynesian period with Joan Robinson (1956) and continued with Kaldor (1970), Moore (1988), and Lavoie (1992). Today, it has deep and complex roots in post-Keynesian economics and constitutes a rallying point against many dominant schools of economic thought, Rochon (2023).

The post-Keynesian endogenous theory holds that money supply is endogenously determined by the demand for credit. That is, the existence of money in an economy is driven by the requirements of the real economy. Therefore, money supply is credit-driven and demand-determined. The historical roots of endogenous money after Keynes can be traced back to Joan Robinson, who, in *The Accumulation of Capital* (1956), advocated a framework not unlike that of modern post-Keynesians and proponents of Keynes Finance Circuit. Following the work of Keynes and Rosa Luxemburg as indicated in Rochon (2005),

https://doi.org/10.1017/elr.2024.11 Published online by Cambridge University Press

Robinson placed commercial banks and bank credit at the heart of her views on production and capital accumulation. She supports that as the economy grows, banks supply more credit to meet the growing investment demand of the system. At the very instant that a firm receives credit, money is created by the bank carrying out the payment which will generate investment and economic growth as indicated in Keynes Finance Circuit.

Post-Keynesians further demonstrated their alignment with Keynes' Finance Circuit when Robinson (1952) provided the impetus for the demand-following hypothesis expressing Finance Circuit causalities by stating that 'where enterprise leads finance follows' (Robinson 1952, 86). Robinson is pointing out that financial development does not support economic growth but rather responds to financial demand for bank services as the economy continues to grow. The demand-following hypothesis suggests that financial deepening occurs due to bank credit demand stimulated by the expansion of the economy, which will then encourage investment and motivate growth as illustrated in Keynes' Finance Circuit.

Empirical review on Keynes' Finance Circuit model

The main purpose of the present section is to undertake a critical survey of the empirical literature on a complete Keynes' finance transmission mechanism influencing policies pursued in Africa in order to highlight potential issues deemed to break new ground in this paper. Having reviewed Keynesian and post-Keynesian models on banks and their extensions, we now turn to the empirical review of studies determining whether Keynes' Finance Circuit transmission mechanism follows proposed causal patterns.

Iheonu et al (2020) investigated the first causality in the Keynes' finance transmission mechanism, that is, the causality running from domestic bank loans to domestic investment, in ECOWAS (Economic Community of West African States) for the 1985–2017 period. Employing heterogeneous panel data methods, Iheonu et al found that domestic bank loans to the private sector Granger cause domestic investment in ECOWAS. The study recommended that domestic bank loans should be given priority when forecasting domestic investment. The present result supports the first causality relationship suggested in the Finance Circuit.

Bakari (2020) examined the second sequence of the Finance Circuit on the link related to domestic investment and economic growth in Tunisia using the period between 1965 and 2016. Based on the Granger causality test, Bakari found the existence of a unidirectional causality relationship ranging from domestic investment to economic growth. In relation to policy implication, the author advised the Tunisian government to boost investment to stimulate economic growth. This result is the vindication of the second causality proposed in the Keynes Finance Circuit.

Oyedokun and Ajose (2018) also tested the second causality in our model related to the relationship between domestic investment and economic growth, in Nigeria for the period of 1980–2016. The Granger causality test employed, indicated that domestic investment causes economic growth in Nigeria. The study recommended that government should create an economic environment that would stimulate domestic investment through the adoption of relevant macroeconomic policies in Nigeria. The present second test also lends support to the investment economic growth causality suggested in the Financial Circuit.

Kuhe and Torruam (2020) studied the second and the fourth links of Keynes' finance sequential procedure using annual time series data from 1970 to 2015. Based on the Granger causality test, the study finds domestic investment to have positive and significant impact on economic growth in Nigeria. The results of the Granger causality test show statistical evidence of a bidirectional causal relationship between domestic investment and economic growth, as well as a bidirectional causal relationship between

https://doi.org/10.1017/elr.2024.11 Published online by Cambridge University Press

domestic savings and domestic investment. The study recommends that promoting investment for higher economic growth is an effective policy strategy for Nigeria. Investment growth through savings is also a suitable policy option in the short run, as this study shows. We conclude at this juncture that the second and the fourth links of the Keynes' finance sequential procedure are vindicated in the present study.

Chakraborty (2023) tested the third causal association in the Finance Circuit for BRICS countries with the help of data for the period 1990–2020. Both Granger and Dumitrescu–Hurlin panel Granger causality tests were used to explore the above direction of causality which appeared to be in favour of bidirectional causality between savings and economic growth for BRICS countries. In terms of policy implication, the author proposed that policymakers should design monetary and fiscal policies that will be either saving-friendly or income-friendly to investment, which in turn propels economic growth. The results of this study vindicate the third causal association in the Finance Circuit.

Soko (2023) also explored the third relationship of the Finance Circuit between South Africa's aggregate national savings and aggregate national income from 1987 to 2021. The study confirmed that aggregate national saving was positively related to South Africa's economic growth and found that aggregate national saving Granger caused short- and long-run economic growth. In terms of policy recommendation, the author proposed that the South African government should remove obstacles related to all efforts to mobilise national savings by implementing budgetary and monetary policies favourable to savings. The author when on to propose that high saving rates will stimulate income growth through investments in productive sectors, reducing poverty and inequality. The present study does not support the third sequence of Keynes' monetary theory stipulating that economic growth causes savings.

Đidelija (2021) determined the direction of savings causality and economic growth in Bosnia and Herzegovina, as suggested in the third relationship of the Finance Circuit. Granger causality test and the Toda-Yamamoto procedure were applied to test the third causality link in the Finance Circuit using quarterly data from 2000 to 2016. The results of Granger causality test indicated that there is no causal link between savings and economic growth. The present result does not lend support to the Finance Circuit advocating a causal association running from economic growth to saving.

Olayiwola et al (2021) also tested the third link of the Finance Circuit related to economic growth and saving based on the 2000–2019 annual data for Nigeria. Employing a multivariate Vector Error Correction Model (VECM) Granger causality test, the authors found a bidirectional causal relationship between savings and economic growth. The authors therefore urged Nigerian policymakers and the government to increase deposit rates to encourage more savings, thereby mobilising funds from the surplus side of the economy to the deficit side for productive investment. The present result does not support the link suggesting that economic growth boosts savings due to the fact that authors considered savings as a constraint to investment and not the other way round.

Hussen (2020) tested the fourth causality in our model running from saving to investment. Based on data from Ethiopia for the 2000–2029 period, the author employed the Granger causality test to confirm a unidirectional causality running from investment to saving which in turn recommended an investment promoting policies to achieve better national economic performance. This study does not support the Finance Circuit causal relationship running from saving to investment.

Otoo et al (2020) tested the fourth link of the Keynesian finance procedure by identifying the causal relationship between saving and investment in Ghana. The present investigation used annual time series of savings and investment in Ghana spanning from 1980 to 2017. The Johansen's Trace and Maximum Eigenvalue tests for cointegration were performed to ascertain the level of cointegration which suggested a long-run relationship

https://doi.org/10.1017/elr.2024.11 Published online by Cambridge University Press

Table 1. Variable definitions

Variable	Définition	Source
GDP	Annual percentage growth rate of GDP at market prices based on constant local currency. It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources.	WDI
Investment	Gross fixed capital formation includes land improvements and equipment purchases; commercial and industrial buildings.	WDI
Savings	Gross domestic savings are calculated as GDP less final consumption expenditure (total consumption).	WDI
Bank loans	Borrowed from a financial institution. The percentage of respondents who report borrowing any money from a bank, credit union, microfinance institution, or another financial institution such as a cooperative in the past 12 months (% age 15+).	WDI

Source: Author.

between savings and investment in Ghana. The Granger Causality test does support the fourth link in the Finance Circuit since it suggested a unidirectional causality running from savings to investment and not the other way round. In terms of policy implications, the authors recommended intensifying savings, both at the national and household level as a crucial direction for consideration if Ghana intends to finance her investments rather than relying mostly on foreign aid. However, it is crystal clear in this paper that savings cannot limit credit expansion required to finance investment.

Bukamo (2019) also investigated the last causal relationship suggested in the Keynesian finance transmission mechanism. The latter last link is related to the interaction between savings and investment. Employing Ethiopia annual time series data covering the period from 1980 to 2016, the author used Johansen cointegration test analysis to suggest a long-run relationship between savings and investment. Results found from the Granger causality test suggests bidirectional causality running from savings to investment in Ethiopia. Based on the present results, the author recommended a pursuance of policy measures towards mobilising domestic savings and to boost investment. The present investigation does not support the above fourth Finance Circuit link since the study hypothesised savings as constraint to investment and not the other way round.

The above empirical review reveals that since the publication of the General Theory in 1936 where Keynes developed an original Finance Circuit enhanced by post-Keynesians, no author has specifically undertaken a complete empirical test of the above Financial Circuit. More importantly, although causality tests related to a few Keynes' Finance Circuit transmission mechanism patterns are investigated in the above studies, none of the above authors has specifically indicated the link of their study to Keynes or to post-Keynesian theories. The present paper, therefore, breaks new ground and aims at filling the above lacunae by undertaking in the next section a complete empirical test of the finance transmission mechanism advocated by Keynesian and post-Keynesian Economists.

Data, methodology, and analytical framework

Data

In the present econometric analysis, we employ annual data in our sample of 32 African countries, for the period from 1990 to 2021. These data come mainly from the World Development Indicators database (WDI, 2022) as shown in Table 1.

https://doi.org/10.1017/elr.2024.11 Published online by Cambridge University Press

Table 2. Descriptive statistics

Variables	Obs	Mean	Std. Dev.	Min	Max	Skew.	Kurt.
GDP	1056	4.017	7.504	−50.248	149.973	7.529	149.674
Bank loans	1056	12660.303	31374.387	11.323	307000	4.196	24.818
Investment	1056	29.706	92.465	−84.811	862.062	5.406	36.661
Savings	1056	17.622	35.176	−141.095	321.142	2.954	24.882

Source: Author.

Descriptive statistics

Table 2 presents descriptive statistics of data used in this paper. The mean and the standard deviation of variables indicate two main inferences. Firstly, the economic growth rate (GDP) is the second most stable variable in our model. This means that the GDP would be relatively clustered around the average of 1.167. Secondly, bank loans seem to be the most unstable variable in our model, which may be due to structural changes faced by African countries which consequently render the demand for money unsteady and make monetary policy implementation difficult.

Methodology and analytical framework

The short-run causality test

Following the seminal model of Granger (1969) to test the causality between two supposedly stationary variables employing time series, Hurlin (2005) and Dumitrescu and Hurlin (2012) propose to perform the latter test on a heterogeneous panel. The equation below of the autoregressive model helps to understand the meaning of their method:

$$y_{i,t} = \beta_i + \sum_{k=1}^{k} \theta_{ik}\, y_{i,t-k} + \sum_{k=1}^{k} \alpha_{ik}\, x_{i,t-k} + \varepsilon_{i,t}, \quad i = 1, \ldots, N \quad and \quad t = 1, \ldots, T$$

Let $y_{i,t}$ and $x_{i,t}$ be stationary variables observed in N countries during T periods. The evolution of the observations between two countries implies that the coefficients on the variables relating to these countries vary. However, the lag k is assumed to be identical for all the countries in the panel. It is important to note that our model does not have random coefficients, as used by Swamy (1970). The test hypotheses are such that:

$$H_0 : \beta_{i1} = \cdots = \beta_{ik} = 0 \quad \forall\, i = 1, \ldots, N$$

$$H_1 : \beta_{i1} = \cdots = \beta_{ik} = 0 \quad \forall\, i = 1, \ldots, N_1$$

$$\beta_{i1} \neq 0 \text{ or } \cdots \text{ or } \beta_{ik} \neq 0 \qquad \forall\, i = N_1 + 1, \ldots, N$$

The long-run causality test

To examine the long-run causality test between our variables, we apply a panel VECM. According to Asteriou and Hall (2011); Wooldridge (2008) and Hill et al (2011), the VECM is recommended for interconnected economic variables that maintain a long-run relationship. Thus, certain basic conditions must first be fulfilled, implying the stationarity of the same order and the cointegration of the data to be estimated; which leads us to the tests of stationarities and cointegration, before the specification of our model.

https://doi.org/10.1017/elr.2024.11 Published online by Cambridge University Press

Unit root test of panel data

Levin et al (2002) and Im et al (2003) introduced the first-generation tests in a panel assumed to have independent errors over the periods. Pesaran et al (2013) for their part propose correlated errors. These tests are said to be second generation. In the case of financial data, restrictions on errors are natural in the fluctuations because of the fluidity of the data. This justifies the use of second-generation tests in the context of this study, whose equation is in the following form:

$$\Delta Y_{i,t} = \alpha_i + \varphi_i Y_{i,t-1} + \rho_i \overline{Y}_{t-j} + \sum_{j=0}^{p} \theta_{ij} \overline{Y}_{t-j} + \sum_{j=0}^{p} \delta_{ij} \Delta \overline{Y}_t + \varepsilon_{i,j} \quad (1)$$

where Δ is a difference operator, $\overline{Y}_t = \frac{1}{N}\sum_{i=1}^{N} Y_{i,t}$, $\Delta\overline{Y}_t = \frac{1}{N}\sum_{i=1}^{N} \Delta Y_{i,t}$, p denotes the number of lags, and $\varepsilon_{i,j}$ represents the error term. According to Palm et al (2011), the cross-sectional means: $\overline{Y}_t$ and $\Delta\overline{Y}_t$ capture unobserved variables in Equation (1).

Cointegration tests of panel data

According to Westerlund and Basher (2008), and Westerlund et al (2014), the tests most used in econometric analyses are those of Pedroni (1999, 2004) and Kao (1999). However, Westerlund (2007) also proposes an alternative test relating to the structure of the error, and not to its dynamics as assumed by Pedroni and Kao.

- Pedroni Panel Cointegration Test

Pedroni (1999, 2004) proposes a set of statistics (see Table 3) for testing the null hypothesis of the absence of cointegration between variables. According to Neal (2014), the Pedroni test allows for heterogeneity in the panel and is performed on the following equations:

$$y_{it} = \alpha_i + \gamma_i t + \beta_{1i} X_{it} + \cdots + \beta_{mi} X_{mit} + \varepsilon_{it} \quad (2)$$

$$\Delta y_{it} = \beta_{1i} \Delta X_{it} + \cdots + \beta_{mi} \Delta X_{mit} + \vartheta_{it} \quad (3)$$

$$\hat{\varepsilon}_{i,t} = \hat{Y}_i \hat{\varepsilon}_{i,t} + \hat{\vartheta}_{it} \quad (4)$$

$$\hat{\varepsilon}_{i,t} = \hat{Y}_i \hat{\varepsilon}_{i,t} + \hat{\vartheta}_{it} + \sum_{h=1}^{H} \hat{Y}_{i,h} \Delta \hat{\varepsilon}_{i,t-h} \hat{\vartheta}_{it}^{*} \quad (5)$$

$i = 1, \ldots, N$; $t = 1, \ldots, T$; $m = 1, \ldots, M$; $h = 1, \ldots, H$; and Δ represent respectively, the number of countries in the panels, the study period, the number of regressors, the number of lags, the linear trend parameter, and the difference operator. The final statistic proposed by the author is obtained at the end of the regression of each of Equations (2–5), making it possible to obtain the long-run relationship (Pedroni 1999).

- The KAO Panel Cointegration Test

Kao (1999) bases his analyses on the Dickey–Fuller and augmented Dickey–Fuller tests proposed in 1981. The null hypothesis of absence of cointegration proposed by Kao (1999) is tested on the following model:

$$y_{it} = \alpha_i + \beta_{1i} X_{it} + \varepsilon_{it} \quad (6)$$

Such that $i = 1, \ldots, N$; $t = 1, \ldots, T$ designate respectively the number of countries in the panel and the observation periods. The author proposes to apply the Dickey–Fuller test to the equation:

$$\hat{\varepsilon}_{i,t} = \partial \hat{\varepsilon}_{i,t-1} + \mu_{i,t} \quad (7)$$

$\hat{\varepsilon}_{i,t}$ is estimated from Equation (7).

https://doi.org/10.1017/elr.2024.11 Published online by Cambridge University Press

• Westerlund Error-correction-based Panel Cointegration Tests

On the equation:

$$\Delta y_{it} = d_t\alpha_i + \gamma_i Y_{i,t-1} + \sigma_i X_{i,t-1} + \sum_{j=1}^{J} \gamma_{i,j}\Delta Y_{i,t-1} + \sum_{j=1}^{J} \sigma_{i,j}\Delta X_{i,t-1} + \varepsilon_{it} \quad (8)$$

Werlund suggests applying four tests (Table 3). If $\gamma_i < 0$, there is error correction implying that the variables Y and X are cointegrated. However, when $\gamma_i = 0$, this means an absence of error correction reflecting a non-cointegration between the variables tested (Westerlund 2007).

• An Application of VECM Approach

The observation of long-run causality between economic variables is conditioned by the answer to the question: How to model long-run behaviour between variables? Following the work of Pédroni, Kao, and Westerlund, we propose a VECM Approach inspired by Granger (1986) in the following form:

$$\Delta y_{it} = \beta_{it} + \sum_{\substack{i=1 \\ j=1}}^{J} \alpha_{ij}\Delta Y_{i,t-k} + \alpha_t \Delta CET_{i,t} + \mu_{it} \quad (9)$$

This equation takes into account the scaled residual of the equation: $\hat{\varepsilon}_{i,t} = Y_{it} - \hat{\beta}_i - \hat{\alpha}_i X_{i,t}$, which now contains information on the long run and the fitted process of its long-run equilibrium (Asteriou and Hall 2011). CET is the corrected error term and μ_{it}represents the residual. Equation (9) can be specified for each frame of the economy. So, we have

• Keynes Finance Circuit Model

$$\Delta I_{i,t} = \beta_{1t} + \alpha_{1t}\Delta BL + \alpha_{2t}\Delta EG_{i,t} + \alpha_{3t}\Delta S_{i,t} + \alpha_{6t}\Delta CET_{i,t} \quad (10)$$

$$\Delta BL_{i,t} = \beta_{1t} + \alpha_{1t}\Delta I_{i,t} + \alpha_{2t}\Delta EG_{i,t} + \alpha_{3t}\Delta S_{i,t} + \alpha_{6t}\Delta CET_{i,t} \quad (11)$$

$$\Delta EG_{i,t} = \beta_{1t} + \alpha_{1t}\Delta BL_{i,t} + \alpha_{2t}\Delta I_{i,t} + \alpha_{3t}\Delta S_{i,t} + \alpha_{6t}\Delta CET_{i,t} \quad (12)$$

$$\Delta S_{i,t} = \beta_{1t} + \alpha_{1t}\Delta BL_{i,t} + \alpha_{2t}\Delta EG_{i,t} + \alpha_{3t}\Delta I_{i,t} + \alpha_{6t}\Delta CET_{i,t} \quad (13)$$

where EG stands for economic growth, BL stands for bank loans, S for savings, and I for investment. Two types of methods can be applied for Equations (10–13). These are the Fixed Effect Ordinary Least Squares (OLS) method, and the Generalized Method of Moments (GMM) at two levels (Eagle and Granger 1987).

Results and discussion

Table 3 summarises the stationarity and cointegration tests of the variables. The first part of this table presents the Im-Pesaran-Shin stationarity test which indicates that all variables utilised in the Keynes Finance Circuit model tests are stationary at the 1% significance level. We thus show that the variables are integrated of order 1 and could maintain a long-run relationship. Furthermore, the Kao and Westerlund cointegration tests show cointegration, that is, a long-run relationship between the variables tested in the present study.

The first part of Table 4 presents the results of the Dumitrescu and Hurlin (2012) test in the short run. The complete Keynes Finance Circuit model is vindicated in the short run at 1% significance level. In the second part of Table 4, the Juodis et al (2021) method equally

https://doi.org/10.1017/elr.2024.11 Published online by Cambridge University Press

Table 3. Summary of stationarity and cointegration tests

		IPS test				
	Lags	Intercept *t*-bar	Intercept and trend *t*-bar	Lags	Intercept *t*-bar	Intercept and trend *t*-bar
EG	0	−26.649	−24.106 I	0	−26.619	−24.208
	1	−15.276	−11.954	1	−14.991	−12.338
	2	−9.080	−5.632	2	−11.099	−9.034
	3	−6.693	−2.966	3	−4.729	−3.025
BL	0	−28.495	−25.472			
	1	−17.505	−14.067			
	2	−13.380	−9.919			
	3	−8.418	−4.739			

Variables	Kao test				
	DF	ADF	Modified DF	UMDF	UDF
I – BL	−30.321***	−18.643***	−45.284***	−54.147***	−30.704***
EG – I				−52.482***	−28.397***

	Pedroni test		
	ADF	MPP	PP
S – I	−27.667***	−22.111***	−27.538***
I – EG	−27.515***	−23.049***	−26.590**
EG – S	−27.742***	−22.915***	−27.071***

		Westerlund test					
Variables	iceStatistic	Value	Z-value		Statistic	Value	Z-value
BL – I	Gt	−3.580	−14.155	I-EG	Gt	−2.283	−7.103
	Ga	−21.681	−22.237		Ga	−11.481	−9.550
	Pt	−22.970	−17.205		Pt	−15.580	−10.874
	Pa	−25.981	−48.756		Pa	−14.629	−26.578
S – I	Gt	−3.557	−14.034	EG-S	Gt	−3.047	−11.258
	Ga	−19.358	−19.348		Ga	−17.209	−16.674
	Pt	−21.390	−15.851		Pt	−18.116	−13.046
	Pa	−19.096	−35.306		Pa	−18.983	−35.085

Source: Author.
Note: (1) H0: No cointegration between the series of two variables. Automatic lag selection is based on AIC. (2) Trend assumption: No deterministic trend. (3) Trend assumption: Deterministic intercept and trend. (4) H0: No cointegration between the series LnDPS and LnPS. Automatic lag selection is based on AIC.
*Significant at the 1 % level.

shows a complete vindication of the Keynes Finance Circuit model at 1% significance level in the short run.

The present investigation in the short run, therefore, supports Keynesian and post-Keynesian arguments stipulating that as the economy continues to grow, banks will respond to the demand for loans to meet the growing investment demand which, in turn,

https://doi.org/10.1017/elr.2024.11 Published online by Cambridge University Press

Table 4. Short-run causalities

			Dumitrescu method				
Hypothesis	*Z*-bar	*Z*-bar tilde	Lags	Hypothesis	*Z*-bar	*Z*-bar tilde	Lags
EG – I	−2.7104	−2.6451	I	S – EG	−1.6785	−1.9705	4
	(.0067)	(.0082)			(.0932)	(.0488)	
BL – I	47.5472	41.5687	I	EG – S	5.2258	3.3286	4
	(.0000)	(.0000)			(.0000)	(.0009)	
I – BL	−2.1614	−2.1621	I	S – I	−2.5109	−2.4697	I
	(.0307)	(.0306)			(.0120)	(.0135)	
I – EG	−1.0093	−1.1486	I	I – S	5.0978	4.2241	I
	(.3128)	(.2507)			(.0000)	(.0000)	

			Juodis method				
	Wald test	*P*-value	Decision		Wald test	*P*-value	Decision
BL – I	5.127	(.0236)	Yes	S – EG	18.269	(.0001)	Yes
I – BL	22.433	(.0000)	Yes	EG – S	39.7440	(.0000)	Yes
I – EG	2.549	(.1104)	No	S – I	67.7689	(.0000)	Yes
EG – I	3.931	(.0474)	Yes	I – S	73.336	(.0000)	Yes

Source: Author.
Note: The values in parentheses are *P*-values.

will stimulate economic growth and, via the multiplier, economic growth will cause national savings. The association between investment and savings in the Finance Circuit is explained by the expenditure multiplier as a mechanism which brings savings and investment into equality. Keynes Finance Circuit in the short run can, therefore, be illustrated as follows: Bank loans → Investment → Economic Growth → Savings → Investment

The present results have also supported post-Keynesian contribution from economists such as Joan Robinson (1956), Kaldor (1970), Moore (1988), and Lavoie (1992) who argued that the above loans supplied by commercial banks are endogenous. That is determined by the demand for credit. As soon as a firm receives credit, at this very instant, money is created by the bank carrying out the payment which will generate investment and economic growth as indicated in Keynesian Finance Circuit.

To undertake the long-run causality tests related to the complete Keynes Finance Circuit model, variables in Table 5 are taken into account in difference and with logarithmic values. With regard to the negative and statistically significant values of the residuals,, the results contained in Table 5 and summarised in Table 6 show that in the long run, at 1% significance level, all causalities are vindicated except for the causality running from economic growth to savings. Therefore, savings in African countries may not be relevant to be stimulated by economic growth. Investment can be constrained through shortage of credit rather than a shortage of savings (Keynes 1937, 222). Furthermore, post-Keynesian economists such as Snippe (1985, 1986), Terzi (1986), Richardson (1986), Kregel (1984, 1986), and Chick (1988) argue that a shortage of savings in the economy cannot limit credit expansion and consequently economic growth, since the amount of cash coming into banks will be sufficient to replenish the pre-existing revolving fund of finance.

https://doi.org/10.1017/elr.2024.11 Published online by Cambridge University Press

https://doi.org/10.1017/elr.2024.11 Published online by Cambridge University Press

Table 5. Long-run causalities

	Dep variable: BL			Dep variable: GDP			Dep variable: Invest			Dep variable: GDP	
Var	OLS	GMM	Var	OLS	GMM	Var	OLS	GMM	Var	OLS	GMM
$\beta_{22,i}$	−.18**	−.18***	$\beta_{22,i}$	0.01	−.04***	$\beta_{22,i}$	−.04	−.04***	$\beta_{22,i}$	−.02	−.02***
Invest	−.02	.11***	Invest	.15***	.21***	GDP	.07***	.17***	Savings	0.01	0.01
Resi	−.57***	−.61***	Resi	−.55***	−.59***	Resi	−.51***	−.56***	Resi	−.54***	−.54***
Obs	517	517	Obs	377	377	Obs	547	547	Obs	547	547
R^2	0.31		R^2	0.33		R^2	0.24		R^2	0.29	
AR1		−5.29***	AR1		−3.56***	AR1		−4.27***	AR1		−4.04***
AR2		−.78	AR2		−2.71	AR2		−3.02	AR2		−2.65

	Dep variable: Savings			Dep variable: Savings			Dep variable: Invest	
Var	OLS	GMM	Var	OLS	GMM	Var	OLS	GMM
$\beta_{22,i}$	−.04	−.04	$\beta_{22,i}$	−.01	−.01	$\beta_{22,i}$	−.04	−.04***
GDP	0.07	0.17	Invest	.15***	0.21	Savings	.56***	.95***
Resi	−.51***	−.56***	Resi	−.46***	−.59***	Resi	.21***	.45***
Obs	547	547	Obs	437	437	Obs	437	437
R^2	0.24		R^2	0.26		R^2	0.08	
AR1		−4.27***	AR1		−3.91***	AR1		−4.00***
AR2		−3.02	AR2		−2.89	AR2		1.79

Source: Author.

Table 6. Summary of short-run and long-run causality tests

Short run		
Bank loans	→	Investment
Investment	→	Bank loans
Investment	→	Growth
Growth	→	Investment
Savings	→	Growth
Growth	→	Savings
Savings	→	Investment
Investment	→	Savings
Long run		
Bank loans	→	Investment
Investment	→	Bank loans
Investment	→	Growth
Growth	→	Investment
Savings	/→	Growth
Growth	/→	Savings
Savings	→	Investment
Investment	→	Savings

Source: Author.

Conclusion

The aim of this paper was to review and test Keynes Finance Circuit model enhanced by insights from post-Keynesian economists. The central role placed on banks in the model is rendering our tests relevant in an African context since banks are closely involved with industrial firms and companies rely heavily on bank loans. Banks, therefore, play a key role in economic growth and development.

The literature review has indicated that post-Keynesian endogenous theory is an economic paradigm that stems from the work of Keynes in his Financial Circuit model. The latter model was developed by Keynes (1937) and holds in the short and in the long run. That is, as the economy grows, banks supply more credit to meet the growing investment demand of the system. Money created will generate investment that will stimulate economic growth. More importantly, we have investigated the above causalities inherent in Keynes Finance Circuit model using the Granger non-causality test for heterogeneous panel data models on 32 African countries from 1990 to 2021. Our results support the complete model in the short run. While in the long run, all causalities are vindicated except the causal relationship running from economic growth to savings which appears insignificant. We, therefore, suggested that, savings in African countries, in the long run, may not be relevant to be stimulated by economic growth. Investment can be constrained through shortage of credit rather than a shortage of savings (Keynes 1937, 222). Furthermore, a shortage of savings in the economy cannot limit credit expansion as argued by Keynesian and post-Keynesian economists in this paper.

On the basis of our results, we are proposing that policymakers should design policies that stimulate economic growth within a post-Keynesian endogenous money supply

https://doi.org/10.1017/elr.2024.11 Published online by Cambridge University Press

framework. For example, as the economy grows, low rather than liberalised lending interest rates should be encouraged in Africa to stimulate variables related to Keynes Finance Circuit.

Funding statement. There are no funders to report for this submission.

Competing interests. None.

References

Arestis P, Machiko N and Howard S (2003) *Finance and Development: Institutional and Policy Alternatives to Financial Liberalization*, Working Paper, No. 377, Annandale-on-Hudson NY: Levy Economics Institute of Bard College.

Asteriou D and Hall SG (2011) *Applied Econometrics*. Basingstoke: Palgrave Macmillan.

Bakari S (2020) *Domestic Investment and Economic Growth in Tunisia*. Chisinau Moldova: Scholars' Press.

Bougrine H and Rochon L-P (2020) *Economic Growth and Macroeconomic Stabilization Policies in Post-Keynesian Economics*. Cheltenham: Edward Elgar.

Bukamo Z (2019) The causal relationship between saving and investment in Ethiopia. *Global Scientific Journal* 7(4), 1–20.

Chakraborty D (2023) Exploring causality between domestic savings and economic growth: fresh panel evidence from BRICS countries. *Economic Alternatives* 1(1), 48–69. https://doi.org/10.37075/EA.2023.1.03

Chick V (1988) Sources of finance, recent changes in bank behaviour and the theory of investment and interest. In Arestis P (ed), *Contemporary Issues in Money and Banking*. London: Macmillan, 30–48.

Đidelija I (2021) The causal link between savings and economic growth in Bosnia and Herzegovina. *South East European Journal of Economics and Business* 16(2), 114–131. https://doi.org/10.2478/jeb-2021-0018

Dumitrescu E and Hurlin C (2012) Testing for Granger non-causality in heterogeneous panels. *Economic Modelling* 29(4), 1450–1460. https://doi.org/10.1016/j.econmod.2012.02.014

Eagle RF and Granger CWJ (1987) Cointegration and error correction: representation, estimation, and testing. *Econometrica* 55(1), 251–276.

Granger CJ (1969) Investigating causal relations by econometric models and cross-spectral methods. *Econometrica* 37(3), 424–438.

Hill RC, Griffiths WE and Lim GC (2011) *Principles of Econometrics*. Hoboken, NJ: Wiley.

Hurlin C (2005) Un test simple de l'Hypothèse de Non Causalité dans un Modelé de panel Hétérogène. *Revue Economique* 56(3), 799–809.

Hussen MA (2020) The causal nexus between saving and investment in Ethiopia. *International Journal of Economics, Commerce and Management* 8(12), 584–600.

Iheonu CO, Asongu SA, Odo KO and Ojiem, PK (2020) Financial sector development and Investment in selected countries of the Economic Community of West African States: empirical evidence using heterogeneous panel data method. *Financial Innovation* 6(1), 1–15. https://doi.org/10.1186/s40854-020-00195-0

Im KS, Pesaran MH and Shin Y (2003) Testing for unit roots in heterogeneous panels. *Journal of Econometrics* 115(1), 53–74. https://doi.org/10.1016/S0304-4076(03)00092-7

Juodis A, Karavias Y and Sarafidis V (2021) A homogeneous approach to testing for Granger non-causality in heterogeneous panels. *Empirical Economics* 60, 93–112. https://doi.org/10.1007/s00181-020-01970-9

Kaldor N (1970) The new monetarism. *Lloyds Bank Review* 97(1), 1–18.

Kalecki M (1935) A macrodynamic theory of business cycles. *Econometrica* 3(3), 327–344, reprinted in J. Osiatynski (ed.), Collected Works of Michal Kalecki, Vol. I: Capitalism: Business Cycles and Full Employment, Oxford: Clarendon Press, (1990), 120–138.

Kao C (1999) Spurious regression and residual-based tests for cointegration in panel data. *Journal of Econometrics* 90(1), 1–44. https://doi.org/10.1016/S0304-4076(98)00023-2

Keynes JM (1936) *The General Theory of Employment Interest and Money*. London: Macmillan.

Keynes JM (1937) The general theory of employment. *Quarterly Journal of Economics* 51(2), 209–223.

Keynes JM (1973) *A Treatise on Probability. The Collected Writings of John Maynard Keynes. vol. VIII*. London: Macmillan.

King JE (2013) A brief introduction to Post Keynesian macroeconomics. *Wirtschaft und Gesellschaft - WuG* 39(4), 485–508.

Kregel JA (1984) Constraints on the expansion of output and employment: real or monetary? *Journal of Post Keynesian Economics* 7(2), 139–152.

Kregel JA (1986) A note on finance, liquidity, saving and investment. *Journal of Post Keynesian Economics* 9(1), 91–100.

Kuhe DA and Torruam JT (2020) Cointegration and causality inferences on domestic savings, investment and economic growth in Nigeria. *Mediterranean Journal of Basic and Applied Sciences* 4(2), 54–71. https://doi.org/10.46382/mjbas.2020.4206

https://doi.org/10.1017/elr.2024.11 Published online by Cambridge University Press

Lavoie M (1992) *Foundations of Post-Keynesian Economic Analysis*. Cheltenham: Edward Elgar.
Levin A, Lin C and Chu CJ (2002) Unit root tests in panel data: asymptotic and finite-sample properties. *Journal of Econometrics* 108(1), 1–24. https://doi.org/10.1016/S0304-4076(01)00098-7
Moore BJ (1988) *Horizontalists and Verticalists: The Macroeconomics of Credit Money*. Cambridge: Cambridge University Press.
Neal T (2014) Panel cointegration analysis with xtpedroni. *Stata Journal* 14(3), 684–692. https://doi.org/10.1177/1536867X1401400312
Olayiwola AS, Okunade SO and Fatai MO (2021) Savings-growth nexus revisited: an empirical analysis from Nigeria. *African Journal of Economic Review* 9(8), 223–237.
Otoo H, Sampson TA, Buabeng A and Apodei M (2020) Testing causality and cointegration between savings and investment in Ghana. *European Journal of Engineering Research and Science* 5(2), 132–137. https://doi.org/10.24018/ejeng.2020.5.2.1734.
Oyedokun GE and Ajose K (2018) Domestic investment and economy growth in Nigeria: an empirical investigation. *International Journal of Business and Social Science* 9(2), 130–138.
Palm FC, Smeekes S and Urbain JP (2011) Cross-sectional dependence robust block bootstrap panel unit root tests. *Journal of Econometrics* 163, 85–104. https://doi.org/10.1016/j.jeconom.2010.11.010
Pedroni P (1999) Critical values for cointegration tests in heterogeneous panels with multiple regressors. *Oxford Bulletin of Economics and Statistics* 61(1), 653–670.
Pedroni P (2004) Panel cointegration: asymptotic and finite sample properties of pooled time series tests with an application to the PPP hypothesis. *Econometric Theory* 20(3), 597–625. https://doi.org/10.1017/S0266466604203073
Pesaran MH, Smith LV and Yamagata T (2013) Panel unit root tests in the presence of a multifactor error structure. *Journal of Econometrics* 175(2), 94–115. https://doi.org/10.1016/j.jeconom.2013.02.001
Post-Keynesian Economics Society (2024) Available at https://www.postkeynesian.net/.
Richardson DR (1986) Asimakopulos on Kalecki and Keynes on finance, investment and saving. *Cambridge Journal of Economics* 10(2), 191–198.
Robinson J (1952) *The Generalization of the General Theory and Other Essays*. London: The McMillan Press Ltd.
Robinson J (1956) *The Accumulation of Capital*. London: Macmillan.
Rochon L-P (2023) The future of post-Keynesian economics: post-Keynesian economics at 50. *The Journal of Philosophical Economics* 15(1), 254–279. https://doi.org/10.46298/jpe.10890
Rochon L-P (2005) Joan Robinson on Money, Credit and Finance. In Gibson B (ed), *Joan Robinson's Economics, a Centennial Celebration*, Cheltenham: Edward Elgar, 267–281.
Snippe J (1985) Finance, saving and investment in Keynes's economics. *Cambridge Journal of Economics* 9(3), 257–269.
Snippe J (1986) Finance, saving and investment in Keynes's economics: a reply. *Cambridge Journal of Economics* 10(4), 373–377.
Soko Y (2023) South Africa's saving and economic development linkage: causal relationship examination. *Journal of Developing Economies* 8(2), 231–243. https://doi.org/10.20473/jde.v8i2.40462
Swamy PAVB (1970) Efficient inference in a random coefficient regression model. *Econometrica* 38(2), 311–323.
Terzi A (1986) Finance, investment and saving: a comment on Asimakopulos. *Cambridge Journal of Economics* 10(1), 77–80.
Westerlund J (2007) Testing for error correction in panel data. *Oxford Bulletin of Economics and Statistics* 69(6), 709–748. https://doi.org/10.1111/j.1468-0084.2007.00477.x
Westerlund J and Basher S (2008) Mixed signals among tests for panel cointegration. *Economic Modelling* 25(3), 128–136. https://doi.org/10.1016/j.econmod.2007.05.003
Westerlund J, Thuraisamy K and Sharma S (2014) On the Use of panel cointegration tests in energy economics. *Energy Economics* 50(2), 359–363.
Wooldridge JM (2008) *Econometric Analysis of Cross Section and Panel Data*. Cambridge, MA: The MIT Press.

Jacob Tche is an Associate Professor in Economics at the University of Yaounde II and a visiting Professor at the University of Yaounde I, in Cameroon. He has a Bachelor's degree in Economics from the University of Buckingham in the UK, Master's and Doctorate in Economics from London Guildhall University in the UK. He has authored and co-authored a substantial number of articles and books that delve into various aspects of Financial Development, Economic Growth, Microeconomics and Sustainable Development.

Cite this article: Tche J (2024). Keynes' Finance Circuit model on banks in Africa. *The Economic and Labour Relations Review* **35**, 103–117. https://doi.org/10.1017/elr.2024.11