Bank Development and Unemployment in Kenya: An Empirical Investigation

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This study has empirically investigated the impact of bank development on unemployment in Kenya, based on time-series data spanning from 1991 to 2019. Using the ARDL bounds testing approach, the results of the study have revealed that in Kenya, the impact of bank development on unemployment, though time-invariant, depends largely on the proxy used to measure the level of bank development. Consistent with expectations, bank development – as proxied by liquid liabilities, bank deposits, deposit money bank assets and the banking development index – has been found to have a negative impact on unemployment in Kenya. However, when bank development is proxied by the domestic credit to private sector by banks, its impact on unemployment was found to be statistically insignificant. These results were found to apply consistently in the long run and in the short run.

Key Words: unemployment, bank development, bank-based financial development, financial development, Kenya, ARDL
JEL Classification: E24, G2

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Introduction and Motivation

Although alternative views exist (see Van Wijnbergen 1983; Buffie 1984; Lucas 1988; Robinson 1952), financial development has long been widely recognised as an engine for growth, from as early as the early 20th century (see, among others, Schumpeter 1911; Goldsmith 1969; Shaw 1973; Gelb 1989; Roubini and Sala-i-Martin 1992; King and Levine 1993; Odedokun 1996; Asongu 2015; Odhiambo and Nyasha 2019; Asongu, Nnanna, and

Acha-Anyi 2020). Several studies that empirically examined the impact of financial development on economic growth in Kenya confirm this notion that financial development is good for economic growth (see Kagochi 2013).

Although earlier studies recognised the importance of a well-developed financial system in solving national economic growth challenges, it is only recently that economists started focusing on examining the impact of financial development on the levels of unemployment (see, among others, Epstein and Shapiro 2018; Kanberoğlu 2014; Han 2009). Since the finance-unemployment nexus is still relatively new, a lot of African countries have not received befitting coverage, Kenya included, yet the outcome of such studies is key in driving related policies.

The choice of Kenya as a country of study is two-fold. It was motivated by the finance dynamics in this country, on the one hand, and the unemployment trends, on the other. Kenya has a growing financial sector, which has shown great improvement in the past few decades (Nyasha and Odhiambo 2016). Its financial liberation journey has resulted in a financial system that can be counted among the modest financial systems in Africa. From the labour market side, Kenya is one of the African countries with the lowest rate of unemployment. According to the World Bank (2020), the International Labour Organisation (ILO) modelled unemployment rate for Kenya was always below the 3% mark over the review period – which has been consistently lower than the global unemployment rate (International Labour Organization 2019). Given Kenya's remarkable performance in both the financial sector and the unemployment fronts, it is worth putting the finance-unemployment nexus to an empirical test in Kenya, to observe if these trends are related or coincidental.

Though Kenya's financial system consists of financial intermediaries and capital markets, which are both still at a developing stage, it is the banking sector that plays a leading role in savings mobilisation, capital allocation, and oversight of investment decisions of corporate managers, as well as the provision of risk management vehicles (Demirguc-Kunt and Levine 2001; Nyasha and Odhiambo 2016). Kenya is, therefore, generally referred to as having a bank-based financial system. For this reason, the study focuses on bank development in Kenya, rather than on the overall financial system, to allow for the examination of the maximum impact of the financial system, if any.

Against this backdrop, the objective of the study is to empirically exam-

ine the impact of bank development on unemployment in Kenya, using the autoregressive distributed lag (ARDL) bounds testing approach. To increase the rigour of the study and to check the robustness of the results, the study uses five proxies of bank development. To capture, as far as possible, the breadth and depth of the Kenyan banking system development, among the five proxies is a banking development index, constructed from the other four proxies using the method of means-removed average. This study is the first of its kind, to our knowledge, to explore in detail the finance-unemployment nexus in Kenya using five different proxies of bank development. Besides weighing in on the finance-unemployment nexus debate globally, the outcome of this study is also expected to contribute significantly to informed and intensified policy options towards improving Kenya's labour market, especially following the coronavirus-related economic shock.

The rest of the paper is organised as follows: the second section discusses the dynamics between bank development and unemployment in Kenya, while the third section reviews the literature on the impact of financial development on unemployment. The fourth section is on the methodology used, the fifth section presents the results, and the sixth section concludes the study.

Bank Development and Unemployment in Kenya

Kenya's financial sector consists of deposit-taking institutions such as commercial banks, mortgage finance companies, microfinance banks and deposit-taking Savings and Credit Co-operatives (Saccos); non-deposit-taking institutions such as insurance, pensions, capital markets, and Development Finance Institutions (DFIs); and financial market infrastructure providers (Central Bank of Kenya 2020).

In Kenya, at the apex of the banking sector is the Central Bank of Kenya (CBK), established in 1966 through an Act of Parliament, known as the Central Bank of Kenya Act of 1966. The CBK performs an oversight role in the country's financial system. Over the past decades, Kenya's banking sector has grown. The growth ranges from increased assets, deposits, and profitability to product-offerings.

Kenya is one of the countries that has taken financial liberalisation seriously since the 1970s. Various financial policy reforms were undertaken by Kenya in order to gradually liberalise, modernise and develop its banking system. These reforms aimed at controlling monetary aggregates for macro-economic stabilisation, direct development of the banking sector

in relation to asset allocation as guided by political and economic priorities, and strengthening prudential regulation and supervision (FSD Kenya 2010). In response to the financial reforms undertaken, Kenya's banking sector experienced growth in a number of facets. Foreign banks were challenged by local banks, thereby increasing the presence and influence of local banks in the country's banking sector (Central Bank of Kenya 2020). Credit extension, bank assets and liquid liabilities also increased over the period.

Despite the notable progress in its response to the financial sector reforms, Kenya's banking sector still faces some challenges. According to FSD Kenya (2010), these challenges are interrelated and include high interest rate spreads, high overhead costs and relatively high profit margins, largely driven by the non-sharing of credit information.

Regarding unemployment, Kenya is one of the African countries with the lowest rate of unemployment (International Labour Organization 2019). According to Statista (2020), the unemployment rate in Kenya was 2.64% in 2019. This represents a steady decline from the increase after the financial crisis (Statista 2020). In 2018, Kenya's unemployment rate was also at 2.64%, showing that it had descended to almost its pre-global financial crisis level (of 2.60% in 2008). Though remarkable, whereas it took only one year for the unemployment rate in Kenya to jump from 2.6% in 2008 to 2.79% in 2009, the road to recovery to the original value has been marred with oscillations and has taken a full nine years (The World Bank 2020).

Kenya has been able to maintain low levels of unemployment, arguably as a result of the technicalities associated with how unemployment is defined, where a large number of people are left out of the unemployment net because they depend on agriculture. Kenya is well known for being an agrarian economy (The World Bank 2019).

Despite this technicality, the coronavirus pandemic has created yet another shock in the global economy, Kenya included, leading to sharp rises in Kenya's unemployment levels in 2020, reaching about 10.4% in the second quarter of 2020, from 5.2% in the first quarter of 2020 (Kenya National Bureau of Statistics 2020). Figure 1 attempts to interrogate the dynamics of banking sector development and unemployment trends in Kenya over the period from 1991 to 2019. The banking sector growth in Kenya, as measured by five banking development indicators trended upwards over the review period, in the main, while unemployment trended downwards, also in the main (The World Bank 2020).

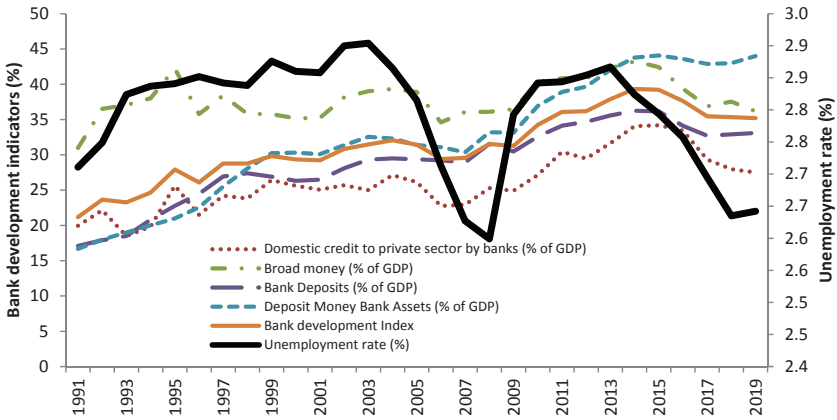

FIGURE 1 Banking Sector Development and Unemployment Trends in Kenya

Literature Review

Theoretically, the development of the banking system negatively impacts unemployment levels through various channels such as capital formation, industrial promotion, employment generation and credit extension to the government (Ernst 2019). Through this provision of direct credit, the government is able to deploy multiple development schemes, which can translate to economic growth and a decrease in unemployment (Bayar 2016; Ernst 2019).

Despite the nexus between financial development and unemployment being relatively new, the empirical trend has shown three outcomes. The first and the most common trend is where financial development has been found to have a negative impact on unemployment, implying that as the financial sector gets more and more developed, unemployment trends downwards (see, among others, Darrat, Abosedra, and Aly 2005; Gatti and Vaubourg 2009; Shabbir et al. 2012; Kanberoğlu 2014; Epstein and Shapiro 2018). The second, but less common, trend is where the development of the financial sector is found to worsen unemployment (see, among others, Gatti and Vaubourg 2009; Shabbir et al. 2012; Kanberoğlu 2014; Ogbeide, Kanwanye, and Kadiri 2015). Then, there is a third trend which confirms the neutrality effect of financial development on unemployment (see, among others, Darrat, Abosedra, and Aly 2005; Ilo 2015; Bayar 2016; Epstein and Shapiro 2018). It is quite interesting that all these trends have found empirical support.

Besides these studies, the finance-unemployment nexus terrain also has studies of the stability, rather than pure development of the financial

TABLE 1 The Impact of Financial Development on Unemployment: A Summary of Reviewed Empirical Literature

	Author(s)	Study country/region	Financial development proxy	Data type	Nature of impact
Direct negative impact	Darrat, Abosedra, and Aly (2005)	United Arab Emirates	The ratio of M2 to nominal GDP; Ratio of demand deposits to the narrow money stock; Credit issued by financial institutions to the non-financial private sector as a share of GDP	Time-series	Negative (only in the long run)
	Gatti and Vaubourg (2009)	Selected OECD member countries (1980–2004)	Stock market capitalisation credits provided by the financial sector	Panel	Negative (only for strongly regulated labour market)
	Shabbir et al. (2012)	Pakistan (1973–2007)	Diverse indicators of financial development	Time-series	Negative (both in the short run as well as in the long run when financial development is proxied by financial sector activities)
	Kanberoğlu (2014)	Turkey (1985–2010)	Major indicators of financial development	Time-series	Negative
	Epstein and Shapiro (2018)	Advanced, developing, and emerging economies	Bank credit-GDP ratio	Panel	Negative (for developing and emerging economies)

Continued on the next page

system, on labour dynamics (see Epstein and Shapiro 2018). Although most of the reviewed studies are largely based on the direct impact of financial development on unemployment, there is a pocket of empirical studies that indirectly focus on the impact of financial development on unemployment. Though indirect, these studies still help in establishing the importance of financial development on unemployment (see,

TABLE 1 *Continued from the previous page*

	Author(s)	Study country/region	Financial development proxy	Data type	Nature of impact
Direct positive impact	Gatti and Vaubourg (2009)	Selected OECD member countries (1980–2004)	Stock market capitalisation credits provided by financial sector	Panel	Positive (only in selected cases when credits provided by financial sector was used as a proxy of financial development)
	Shabbir et al. (2012)	Pakistan (1973–2007)	Diverse indicators of financial development	Time-series	Positive (when financial development is proxied by M2 minus currency in circulation as a ratio of GDP)
	Kanberoğlu (2014)	Turkey (1985–2010)	Major indicators of financial development	Time-series	Positive (when broad money supply was used as a measure of financial development)
	Ogbeide, Kanwanye, and Kadiri (2015)	Nigeria (1981–2013)	Level of banking sector development	Time-series	Positive

Continued on the next page

among others, Caggese and Cunat 2008; Han 2009; Bentolila, Jansen, and Jiménez 2017; Berton et al. 2018).

Table 1 summarises the empirical studies on the finance-unemployment nexus. Although this study is about the impact of the banking sector on unemployment, the relevant empirical studies are scant; hence, focus will also be given to studies that examine the impact of stock markets and financial development in general on unemployment. Despite these variations, the outcome is expected to shed some light on the relationship of interest (bank development and unemployment).

Based on the empirical literature reviewed, it can be concluded that each strand has evidence in its support. However, the strand that supports the negative impact of financial development on unemployment

TABLE 1 *Continued from the previous page*

	Author(s)	Study country/region	Financial development proxy	Data type	Nature of impact
Direct insignificant impact	Darrat, Abosedra, and Aly (2005)	United Arab Emirates	The ratio of M2 to nominal GDP; Ratio of demand deposits to the narrow money stock; Credit issued by financial institutions to the non-financial private sector as a share of GDP	Time-series	Insignificant (in the short run)
	Ilo (2015)	Nigeria (1986–2012)	Market capitalisation	Time-series	Insignificant
	Bayar (2016)	16 emerging market economies (2001–2014)	Domestic credit provided by the private sector as a percentage of GDP	Panel	Insignificant
	Epstein and Shapiro (2018)	Advanced, developing, and emerging economies	Bank credit-GDP ratio	Panel	Insignificant (for the advanced economies)
Indirect negative impact	Caggese and Cunat (2008)	Italy	Financing constraints	Firm-level panel	Negative
	Han (2009)	Tulsa County, USA	Financial hardship	Longitudinal	Negative
	Pagano and Pica (2012)	OECD countries	Banking crises	Panel	Negative
	Bentolila, Jansen, and Jiménez (2017)	Spain	Bank loans to non-financial firms	Firm-level	Largely negative
	Berton et al. (2018)	Italy	Financial shocks	Survey	Negative

appears to be more attractive, with more pieces of evidence than other strands, irrespective of the methodology utilised and whether the investigated impact is direct or indirect.

Estimation Method

ARDL BOUNDS TESTING APPROACH

The objective of this study is to empirically assess the impact of banking sector development on unemployment levels in Kenya. To realise this objective, the study utilises the contemporary autoregressive distributed lag (ARDL) bounds testing method (see Pesaran and Shin 1999; Pesaran, Shin, and Smith 2001; Nyasha and Odhiambo 2015). Incongruent to the best-known conventional estimation procedures such as those anchored on Johansen and Juselius (1990), Johansen (1988) and Engle and Granger (1987), among others, the ARDL approach offers a number of benefits, the most prominent one being its non-restrictive order of integration. While other methods impose a restrictive assumption that all the variables under study must be integrated of the same order, the chosen method still works even when variables are not integrated of the same order, as long as they are of order not more than one (Musakwa and Odhiambo 2019). As opposed to the conventional cointegration methods that utilise a system of equations when estimating the long-run relationships, the ARDL bounds testing procedure only employs a single reduced-form equation (see also Duasa 2007). Furthermore, the ARDL estimation method automatically addresses endogeneity issues as it usually provides unbiased estimates of the long-run model and valid *t*-statistics even when some of the regressors are endogenous (Nyasha and Odhiambo 2020). To top it all, in contrast to the other cointegration techniques that are sensitive to the sample size, the chosen methodology for this study possesses superior small sample properties, which makes it suitable even when the sample size is small (Pesaran and Shin 1999; Odhiambo and Nyasha 2020).

VARIABLE DESCRIPTION AND EMPIRICAL MODEL SPECIFICATION

Unemployment (UNE) is the dependent variable in the study. It is proxied by the national unemployment rate. The independent variable of interest is bank development (BDV). To enhance the rigour and perform robustness checks, five proxies of bank development are employed in this study. These banking development proxies have been widely used in financial development studies (see, among others, Nyasha and Odhiambo 2016; Odedokun 1996; King and Levine 1993).

To fully specify the model and minimise the variable-omission-bias, seven control variables were chosen. These are key determinants of un-

employment, based on theoretical and empirical literature (see, among others, Folawewo and Adeboje 2017), such that:

$$\text{UNE} = f(y, \text{BDV}, \text{FDI}, \text{DIN}, \text{HFC}, \text{GNE}, \text{INR}, \text{EXR}), \quad (1)$$

where each banking development proxy enters the model one at a time.

Variables are:

- UNE is unemployment, proxied by unemployment rate, total (% of total labour force) and is based on national estimates,
- y is economic growth, proxied by annual percentage growth rate of GDP at market prices based on constant 2010 US dollars,
- BDV is bank development, proxied by DCP, LLB, BDP, BAS and BDI,
- DCP is domestic credit to private sector by banks, measured by domestic credit to private sector by banks, expressed as a percentage of GDP,
- LLB is liquid liabilities, expressed as a percentage of GDP,
- BDP is bank deposits, measured by the total value of demand, time and saving deposits at domestic deposit money banks as a share of GDP,
- BAS is deposit money bank assets, calculated as total assets held by deposit money banks as a share of GDP,
- BDI is the bank development index, constructed from DCP, LLB, BDP and BAS using a mean-removed average approach following Nyasha and Odhiambo (2016),
- FDI is foreign direct investment, net inflows as a percentage of GDP,
- DIN is domestic investment, proxied by gross fixed capital formation as a percentage of GDP,
- HFC is household final consumption expenditure as a percentage of GDP,
- GNE is national expenditure proxied by gross national expenditure as a percentage of GDP,
- INR is interest rate, proxied by lending interest rate (%),
- EXR is exchange rate, proxied by real effective exchange rate index (2010 = 100).

The coefficients of all the independent variables are expected to be positive, except for interest rate and exchange rate, whose coefficients are expected to be negative.

The annual time-series data from 1991 to 2019, used in this study, were all obtained from the World Bank Economic Indicators and the World Bank Economic Indicators Archives (The World Bank 2020).

Following Pesaran, Shin, and Smith (2001), the ARDL-based empirical model specification for this study is expressed as follows:

$$\begin{aligned}\Delta \text{UNE}_t = {} & \Phi_0 + \sum_{i=1}^{n} \Phi_{1i} \Delta \text{UNE}_{t-i} + \sum_{i=0}^{n} \Phi_{2i} \Delta \text{BDV}_{t-i} + \sum_{i=0}^{n} \Phi_{3i} \Delta y_{t-i} \\ & + \sum_{i=0}^{n} \Phi_{4i} \Delta \text{FDI}_{t-i} + \sum_{i=0}^{n} \Phi_{5i} \Delta \text{DIN}_{t-i} + \sum_{i=0}^{n} \Phi_{6i} \Delta \text{HFC}_{t-i} \\ & + \sum_{i=0}^{n} \Phi_{7i} \Delta \text{GNE}_{t-i} + \sum_{i=0}^{n} \Phi_{8i} \Delta \text{INR}_{t-i} + \sum_{i=0}^{n} \Phi_{9i} \Delta \text{EXR}_{t-i} \\ & + \Phi_{10} \text{UNE}_{t-1} + \Phi_{11} \text{BDV}_{t-1} + \Phi_{12} y_{t-1} + \Phi_{13} \text{FDI}_{t-1} \\ & + \Phi_{14} \text{DIN}_{t-1} + \Phi_{15} \text{HFC}_{t-1} + \Phi_{16} \text{GNE}_{t-1} + \Phi_{17} \text{INR}_{t-1} \\ & + \Phi_{18} \text{EXR}_{t-1} + \mu_{1t}, \end{aligned} \tag{2}$$

where Φ_0 is constant, $\Phi_{1i} \ldots \Phi_{9i}$ and $\Phi_{10} \ldots \Phi_{18}$ are respective regression coefficients, Δ is the difference operator, n is the lag length, and μ_{1t} is the white noise-error term.

Following the ARDL model specified in equation (2), the related ARDL-based error-correction model is specified as follows:

$$\begin{aligned}\Delta \text{UNE}_t = {} & \Phi_0 + \sum_{i=1}^{n} \phi_{1i} \Delta \text{UNE}_{t-i} + \sum_{i=1}^{n} \phi_{2i} \Delta \text{BDV}_{t-i} + \sum_{i=1}^{n} \phi_{3i} y_{t-i} \\ & + \sum_{i=1}^{n} \phi_{4i} \Delta \text{FDI}_{t-i} + \sum_{i=1}^{n} \phi_{5i} \Delta \text{DIN}_{t-i} + \sum_{i=1}^{n} \phi_{6i} \Delta \text{HFC}_{t-i} \\ & + \sum_{i=1}^{n} \phi_{7i} \Delta \text{GNE}_{t-i} + \sum_{i=1}^{n} \phi 8i \Delta \text{INR}_{t-i} + \sum_{i=1}^{n} \phi_{9i} \Delta \text{EER}_{t-i} \\ & + \varphi \text{ECM}_{t-1} + \mu_t, \end{aligned} \tag{3}$$

where ECM is the error correction term φ is the coefficient of the error correction term. All the other variables and characters remain as described under equation (2).

Results

STATIONARITY

Three unit root tests were utilised in this study – namely, the Augmented Dickey-Fuller, the Dickey-Fuller generalised least squares, and

TABLE 2 Results of Unit Root Test

Variable	Unit root test	At level		At first difference	
		(1)	(2)	(1)	(2)
UNE	ADF	−2.1966	−3.3079	−3.3730***	−4.4028***
	DF-GLS	−1.4264	−2.2058	−3.2906***	−3.8474***
	PP	−1.8235	−2.2731	−3.7457***	−4.3838***
DCP	ADF	−1.9502	−2.4730	−6.2298***	−6.1669***
	DF-GLS	−1.5563	−2.6633	−5.9702***	−6.3248***
	PP	−1.8784	−2.5175	−6.2153***	−6.1963***
LLB	ADF	−3.5024**	−4.4956***	–	–
	DF-GLS	−2.2532**	−2.7165	–	−6.0450***
	PP	−3.5917**	−3.0264	–	−6.6676***
BDP	ADF	−2.6148	−1.2401	−3.7396***	−4.2883**
	DF-GLS	−0.7888	−1.3022	−3.8085***	−4.4154***
	PP	−2.4666	−1.3800	−3.7221***	−4.2883***
BAS	ADF	−1.4172	−4.5591***	−3.7120***	–
	DF-GLS	−0.1306	−3.0116	−3.7601***	−5.0356***
	PP	−1.3406	−1.9226	−3.7513***	−3.7120***
BDI	ADF	2.1092	−1.7012	−5.2925***	−5.4178***
	DF-GLS	−0.8994	−1.8628	−4.6913***	−5.4781***
	PP	−2.1090	−2.1452	−5.2893***	−5.4127***
y	ADF	−3.0960**	−4.5386***	–	–
	DF-GLS	−2.9393***	−4.7097***	–	–
	PP	−3.0608**	−4.8235***	–	–

Continued on the next page

the Phillips-Perron unit root tests – where the latter was chosen to cater for the possibility of structural breaks in the time-series data. A summary of the results of the unit root tests conducted is displayed in table 2. The results of the stationarity tests conducted in this study reveal that most variables are conclusively stationary at first difference while a selected few, such as economic growth (y) and foreign direct investment (FDI), are conclusively stationary at levels, irrespective of the unit root testing method used. These results, therefore, validate the utilisation of the ARDL-based methodology in the empirical investigation of the impact of bank development on unemployment in Kenya.

TABLE 2 *Continued from the previous page*

Variable	Unit root test	At level		At first difference	
		(1)	(2)	(1)	(2)
FDI	ADF	−3.7493***	−4.2088**	–	–
	DF-GLS	−3.7240***	−4.3724***	–	–
	PP	−3.7467***	−4.0949**	–	–
DIN	ADF	−2.3965	−2.6034	−5.4564***	−5.4005***
	DF-GLS	−2.4342**	−2.6336	–	−5.2864***
	PP	−2.4273	−2.6188	−5.9304***	−5.9136***
HFC	ADF	−2.0926	−2.1164	−4.1685***	−4.0810***
	DF-GLS	−0.9765	−1.9222	−3.7033***	−4.0885***
	PP	−2.2708	−1.9978	−4.1297***	−3.9997**
GNE	ADF	−1.7717	−2.0132	−5.2658***	−5.3155***
	DF-GLS	−1.3077	−2.1264	−5.0858***	−5.3954***
	PP	−1.6899	−2.0132	−5.3847***	−7.3744***
INR	ADF	−1.1588	−2.4655	−5.2669***	−5.2044***
	DF-GLS	−1.2106	−4.1452***	−3.4523***	–
	PP	−1.2566	−2.6441	−5.2733***	−5.2061***
EXR	ADF	−2.2167	−3.1509	−4.9089***	−4.9856***
	DF-GLS	−0.6339	−2.6082	−4.9751***	−5.1892***
	PP	−2.2256	−3.1502	−4.9093***	−4.9812***

NOTES Column headings are as follows: (1) intercept, (2) intercept & trend. Unit root tests: ADF – Augmented Dickey-Fuller, DF-GLS – Dickey-Fuller generalised least squares, PP – Phillips-Perron. ** and *** denote stationarity at 5% and 1% significance level.

COINTEGRATION

The cointegration results are presented in Table 3. The outcome of the cointegration test reveals that the variables in the model are cointegrated across all the five functions. Thus, the presence of a stable long-run equilibrium relationship is confirmed between unemployment and the regressors regardless of the proxy of bank development considered.

LONG-RUN AND SHORT-RUN COEFFICIENT ESTIMATION

Having confirmed the long-run equilibrium relationship among the variables in the model, what follows is the estimation of coefficients – both the long-run and short-run coefficients. Table 4 displays a summary of

TABLE 3 Bounds Test *F*-test for Cointegration

Dep. variable	Function	*F*-statistic	Coint. status
BDV = DCP	*F*(UNE | DCP, *y*, FDI, DIN, HFC, GNE, INR, EXR)	4.522***	Cointegrated
BDV = LLB	*F*(UNE | LLB, *y*, FDI, DIN, HFC, GNE, INR, EXR)	6.193***	Cointegrated
BDV = BDP	*F*(UNE | BDP, *y*, FDI, DIN, HFC, GNE, INR, EXR)	3.542**	Cointegrated
BDV = BAS	*F*(UNE | BAS, *y*, FDI, DIN, HFC, GNE, INR, EXR)	6.570***	Cointegrated
BDV = BDI	*F*(UNE | BDI, *y*, FDI, DIN, HFC, GNE, INR, EXR)	6.371***	Cointegrated

Pesaran, Shin, and Smith (2001, 300), table CI(iii), case III	Asymptotic critical value					
	1%		5%		10%	
	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)
	2.79	4.10	2.22	3.39	1.95	3.06

NOTES ** and *** denotes significance at 5% and 1% levels.

the coefficient results. While Panel I of the table presents long-run results, Panel II exhibits short-run results. The impact of bank development on unemployment in Kenya was found to be proxy-dependent, as the outcome varied depending on the proxy used for bank development. Consistent with expectations, bank development as proxied by liquid liabilities (LLB), bank deposits (BDP), deposit money bank assets (BAS) and the banking development index (BDI) have been found to have a negative impact on unemployment in Kenya. However, when bank development is proxied by the domestic credit to private sector by banks (DCP), its impact on unemployment was found to be statistically insignificant. Although these results were mixed depending on the proxy of bank development under consideration, they were time-invariant. These results were found to apply consistently in the long run and in the short run.

The results based on the four functions that have attested to the negative impact of bank development on unemployment are consistent with both theory and other empirical studies. The outcome was consistent with previous results obtained by Darrat, Abosedra, and Aly (2005), Gatti and Vaubourg (2009), Shabbir et al. (2012), Kanberoğlu (2014), and Epstein and Shapiro (2018), for developing and emerging economies. However, the outcome based on domestic credit to private sector by banks

TABLE 4 The Long-Run and Short-Run Results of the Selected Models

	Function	BDV = DCP	BDV = LLB	BDV = BDP	BDV = BAS	BDV = BDI
		(1)	(2)	(3)	(4)	(5)
Panel I: Long-run coefficients; Dependent variable is UNE	DCP	−0.0017 (−0.1600)	–	–	–	–
	LLB	–	−0.0149* (−1.7759)	–	–	–
	BDP	–	–	−0.0368* (−1.8361)	–	–
	BAS	–	–	–	−0.1097** (−2.1195)	–
	BDI	–	–	–	–	−0.0128* (−1.9451)
	y	−0.0057* (−1.8524)	−0.0377* (−1.9461)	−0.0768* (−2.0403)	−0.0441* (−1.8382)	−0.0486** (−2.3986)
	FDI	0.0169 (0.7169)	0.0301 (1.4238)	0.0077 (0.2222)	0.0047 (0.1334)	0.0426 (1.5755)
	DIN	−0.0608** (−2.6949)	−0.0391** (−2.2764)	−0.0467* (−2.0249)	−0.0424* (−1.7824)	−0.0440* (−1.9478)
	HFC	−0.0807** (−2.7751)	−0.0463** (−2.1771)	−0.0690** (−2.7798)	−0.0729** (−2.8017)	−0.0612** (−2.4914)
	GNE	0.0911*** (3.0319)	0.0609** (2.8742)	0.0669** (2.7405)	0.0846*** (3.5103)	0.0727** (2.8970)
	INR	0.0183*** (3.6109)	0.0115** (2.9111)	0.0166*** (3.2926)	0.0181*** (3.3876)	0.0135** (2.9371)
	EXR	0.0031 (−0.5171)	0.0015 (0.7265)	0.0016 (0.5860)	0.0011 (0.3070)	0.0011 (0.3569)
	Constant	−0.5836 (−0.5171)	−0.4393** (−2.6061)	0.3141 (0.2860)	−0.7607* (−1.8436)	−0.3274* (−1.9298)

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(DCP) as a proxy of bank development, though contrary to expectations, is not unusual (see Gatti and Vaubourg 2009; only in selected cases when credits provided by financial sector was used as a proxy of financial development). A possible explanation for it could be inefficient allocation of credit and use of credit for consumption purposes rather than on investment.

Further analysis of the results shows that despite the results being mixed depending on the proxy of bank development considered, the overall bank development, as proxied by the bank development index

TABLE 4 *Continued from the previous page*

	Function	BDV = DCP	BDV = LLB	BDV = BDP	BDV = BAS	BDV = BDI
		(1)	(2)	(3)	(4)	(5)
Panel II: Short-run coefficients; Dependent variable is ΔUNE	ΔDCP	0.9199 (0.1574)	–	–	–	–
	ΔLLB	–	−0.1177** (−2.3120)	–	–	–
	ΔBDP	–	–	−0.0149** (−2.2002)	–	–
	ΔBAS	–	–	–	−0.1045* (−1.8452)	–
	ΔBDI	–	–	–	–	−0.0256* (−1.9544)
	Δy	−0.0031* (−0.9831)	−0.0249** (−2.2887)	−0.0104* (−1.9434)	−0.0182* (−1.8176)	−0.0187* (−1.8872)
	ΔFDI	0.0091 (0.7368)	0.01560 (1.6429)	0.0035 (0.7790)	0.0056 (1.1604)	0.0040 (0.8591)
	ΔDIN	−0.0172* (−1.9360)	0.3036* (1.8955)	0.0159** (2.3161)	0.0118* (1.9962)	0.9732** (2.4076)
	ΔHFC	−0.0151 (−1.4481)	0.0016 (0.1811)	0.0044 (0.4729)	−0.0053 (−0.5386)	0.1850 (0.5700)
	ΔGNE	0.0171 (1.6600)	0.0044 (0.5322)	−0.0014 (−0.1532)	0.0096 (1.0860)	0.0050 (0.5700)
	ΔINR	0.0098*** (3.0206)	0.0060** (2.2704)	0.0067** (2.1429)	0.0084** (2.4997)	0.0059** (2.1336)
	ΔEXR	0.0017 (0.0842)	0.7573 (0.7436)	0.1070 (0.0059)	0.4922 (0.3048)	0.4690 (0.3580)
	ECM (−1)	−0.5386*** (−3.0235)	−0.5179*** (−3.7330)	−0.4043*** (−0.9714)	−0.4632*** (−3.3003)	−0.4383*** (−3.2780)

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(BDI) has shown that in general, the banking sector in Kenya is important in reducing unemployment, since the coefficient of BDI, which is built from four banking development indicators, has been found to be consistently negative and statistically significant.

The analysis of the results further reveals that as expected, economic growth (y), domestic investment (DIN) and household final consumption (HFC) have a negative and statistically significant impact on unemployment in Kenya, irrespective of the bank development proxy under consideration. While these results applied both in the long run and the short

TABLE 4 *Continued from the previous page*

Function	BDV = DCP	BDV = LLB	BDV = BDP	BDV = BAS	BDV = BDI
	(1)	(2)	(3)	(4)	(5)
R-Squared	0.7654	0.7843	0.8291	0.7724	0.7593
R-Bar-Squared	0.6177	0.6839	0.6154	0.6272	0.5968
SE of Regression	0.0497	0.0363	0.0349	0.0387	0.0383
F-Stat [prob]	4.5683 [0.003]	5.6545 [0.001]	6.4663 [0.000]	4.9005 [0.002]	4.9214 [0.002]
Res Sum of Sq.	0.0271	0.0184	0.0146	0.0194	0.0250
AIC	40.0443	48.8486	50.1072	47.0967	47.3475
SBC	31.3850	39.5232	39.4496	37.1052	38.0221
DW statistic	1.9627	1.9776	2.3180	2.1321	2.0063

NOTES Optimal ARDL model: (1) ARDL(1,0,0,0,1,1,1,0,0), (2) ARDL(1,0,1,0,1,1,1,0,0), (3) ARDL(1,0,1,1,1,1,1,0,1), (4) ARDL(1,0,1,1,1,1,1,0,0), (5) ARDL(1,0,1,0,1,1,1,0,0). *, ** and *** denote 10%, 5% and 1% significant levels, respectively; Δ = first-difference operator.

run for economic growth and domestic investment, they only applied in the long run for household final consumption.

Whereas gross national expenditure (GNE) is statistically insignificant in the short run, across all the proxies of bank development, it was found to be surprisingly positive and statistically significant in the long run across all the unemployment functions, irrespective of the bank development measure utilised. Though unexpected, it is not impossible as this outcome may be a reflection of the quality of spending – i.e. more on non-durable goods consumption – which may not be optimal or desirable for investment promotion and employment creation.

Another variable that this study has found to be worsening unemployment challenges in Kenya is the interest rate (INT), which was found to have a positive impact on unemployment irrespective of whether the estimation was in the long run or in the short run and irrespective of the measure of bank development under consideration. In the meantime, the coefficients of foreign direct investment (FDI) and exchange rate (EXR) were found to be statistically insignificant across both the time horizons and across all proxies of bank development.

The short-run results also attest to the cointegration results that confirmed the existence of a long-run stable relationship among the variables in all the unemployment functions – as evidenced by the coefficient of the error correction term [ECM (–1)] that is negative and statistically signif-

TABLE 5 Results of Diagnostic Tests

LM Test Statistic	Statistic [Probability]				
	BDV = DCP	BDV = LLB	BDV = BDP	BDV = BAS	BDV = BDI
Serial Correlation: CHSQ(1)	0.0153 [0.902]	0.0041 [0.949]	2.7244 [0.154]	0.6261 [0.429]	0.0352 [0.851]
Functional Form: CHSQ(1)	0.8374 [0.316]	2.7058 [0.100]	0.0041 [0.949]	0.0459 [0.874]	0.4484 [0.435]
Normality: CHSQ (2)	1.4098 [0.494]	0.0240 [0.988]	0.7523 [0.687]	0.3781 [0.828]	0.4342 [0.805]
Heteroscedasticity: CHSQ (1)	1.5607 [0.212]	0.2288 [0.632]	0.4881 [0.485]	0.0043 [0.947]	0.0562 [0.813]

icant at the 1% level, irrespective of the measure of bank development. The regression for the underlying ARDL model also fits well across the five functions, as confirmed by *R*-squared of at least 76%.

To check the robustness and the reliability of the results obtained in this study, diagnostic tests were performed on serial correlation, functional form, normality and heteroscedasticity. As reflected in table 5, the results of the diagnostic tests performed reveal that the model passes all the diagnostic tests, regardless of the measure of bank development used.

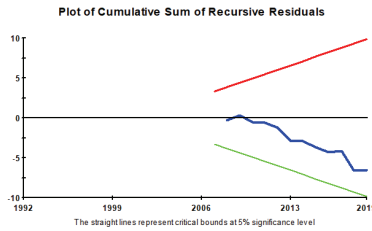
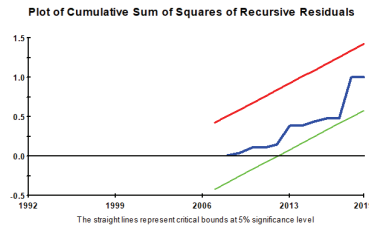
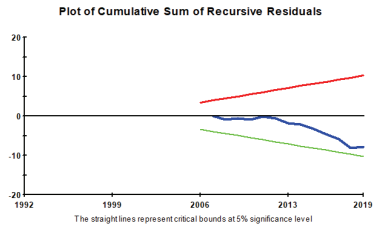
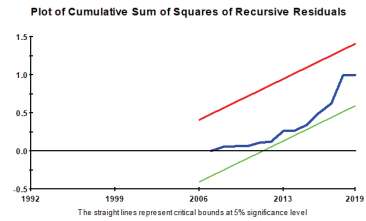
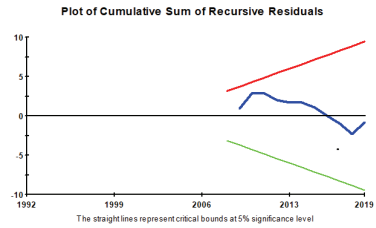
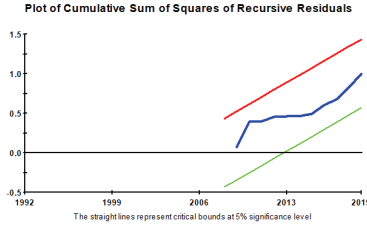
The stability of the model over the study period is also confirmed by the Cumulative Sum of Recursive Residuals (CUSUM) and the Cumulative Sum of Squares of Recursive Residuals (CUSUMSQ) graphs of the estimated model, that are within the critical lower and the upper bounds at the 5% significance level, irrespective of the proxy of bank development used. These graphs are displayed in table 6.

Conclusion

The paper has examined the impact of bank development on unemployment in Kenya using time-series data spanning from 1991 to 2019. The study was motivated by the current insufficient coverage of the finance-unemployment nexus in general, and in Kenya in particular. Kenya makes an interesting case study as it has both a well developing financial sector on the one hand and low levels of unemployment on the other. It has become imperative to establish if both these desirable trends are empirically linked in order to guide policy in an informed manner. The study also aims to add value to the finance-unemployment literature by using a range of bank development proxies.

Using the ARDL bounds testing approach, the results of the study have

TABLE 6 Plot of CUSUM and CUSUMQ

	CUSUM	CUSUMQ
BDV = DCP		
BDV = LLB		
BDV = BDP		

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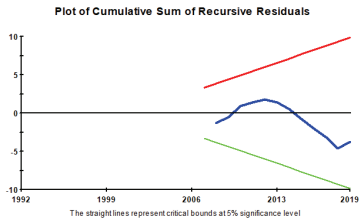
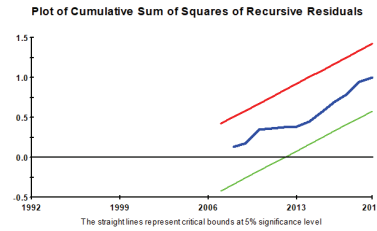
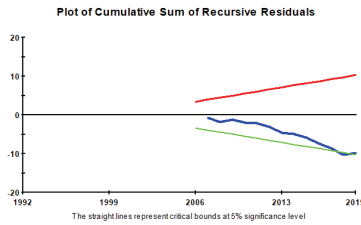
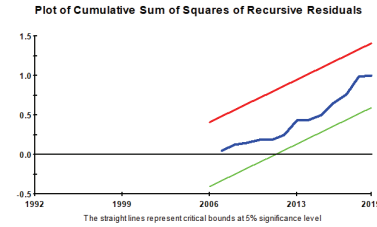
revealed that, in Kenya, the impact of bank development on unemployment is proxy-dependent. As expected, bank development as proxied by liquid liabilities (LLB), bank deposits (BDP), deposit money bank assets (BAS) and the banking development index (BDI) has been found to have a negative impact on unemployment in Kenya. However, when bank development is proxied by domestic credit to private sector by banks (DCP), its impact on unemployment was found to be statistically insignificant. Although these results were mixed depending on the proxy of bank development under consideration, they were time-invariant – as they were found to apply consistently in the long run and in the short run.

Despite being proxy dependent, the results have shown that, in the main, bank development is good for reducing unemployment in Kenya, regardless of the time horizon considered. The Kenyan policy makers in

TABLE 6 *Continued from the previous page*

	CUSUM	CUSUMQ
BDV = BAS		
BDV = BDI		

the macroeconomic space are, therefore, recommended to consider developing the banking sector in an effort to influence unemployment levels in the country. They may need to find strategies of increasing credit efficiency in the economy.

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