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BANK DEVELOPMENT AND UNEMPLOYMENT IN KENYA: AN EMPIRICAL INVESTIGATION[1]

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Abstract

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.

Keywords: Unemployment; bank development; bank-based financial development; financial development; Kenya, ARDL

JEL Classification Code: E24; G2

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1. Introduction

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 et al. 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 a befitting coverage, Kenya included, yet the outcome of such studies are key in driving related policies.

The choice of having Kenya as a country of study is two-fold. It was motivated by the finance dynamics in this country, on the other hand, and the unemployment trends, on the other hand. 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 (ILO 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, 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 considers focusing 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 examine the impact of bank development on unemployment in Kenya, using 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 may be 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: Section 2 discusses the dynamics between bank development and unemployment in Kenya, while Section 3 reviews the literature on the impact of financial development on unemployment. Section 4 is on the methodology used; Section 5 presents the results; and Section 6 concludes the study.

2. Bank Development and Unemployment in Kenya

Kenya's financial sector consists of deposit taking institutions such as commercial banks and 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 markets infrastructure providers (Central Bank of Kenya "CBK" 2020).

In Kenya, at the apex of the banking sector is the CBK, established in 1966 through an Act of Parliament, known as the Central Bank of Kenya Act of 1966 (CBK 2020). The CBK performs an oversight role over 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 was one of the countries that took financial liberalisation seriously since the 1970s, until to date. 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 from 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 (CBK 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.

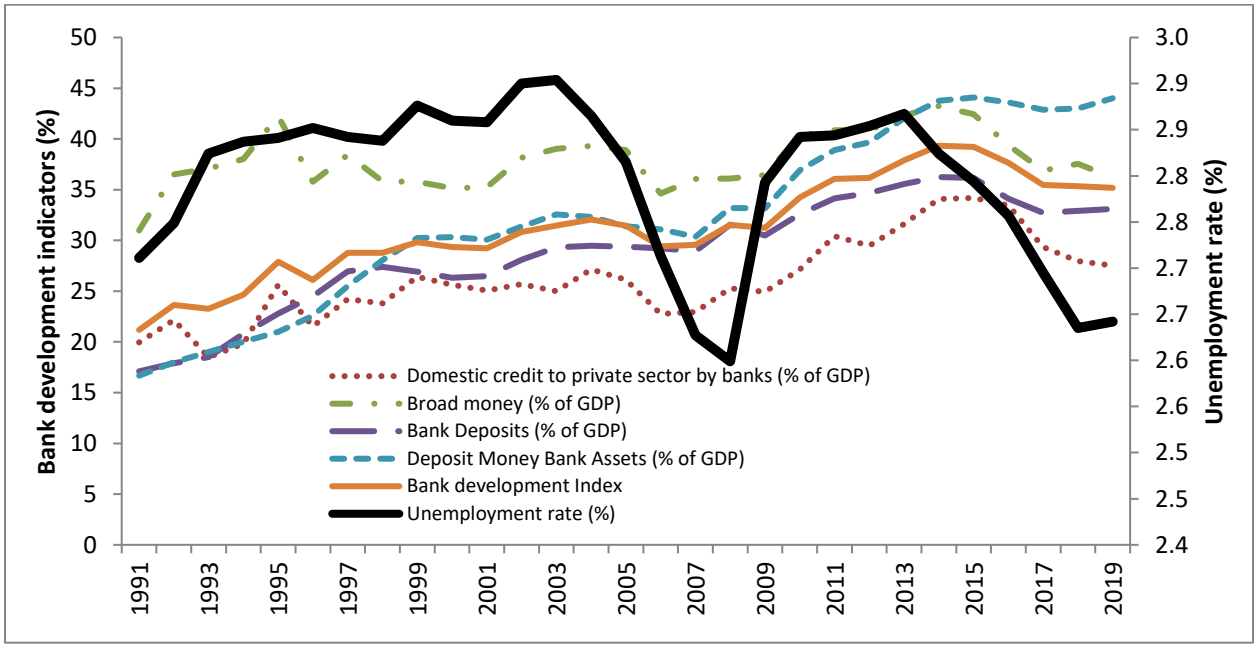
Regarding unemployment, Kenya is one of the African countries with the lowest rate of unemployment (ILO 2019). According to Statista (2020), the unemployment rate in Kenya was 2.64% in 2019. This represents a steady decline from the increase after the financial crisis (Statista 2020). In 2018, Kenya's 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 (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's is well known for being an agrarian economy (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.

Figure 1: Banking Sector Development and Unemployment Trends in Kenya



Source: World Bank (2020)

As attested to in Figure 1, the banking sector growth in Kenya, as measured by five banking development indicators, as explained in detail in Section 4.2, trended upwards over the review period, in the main, while unemployment trended downwards, also in the main (World Bank 2020).

3. Literature Review

Theoretically, the development of the banking system negatively impacts unemployment levels through various channels – such as capital formation, industrial promotion, and 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 on the stability, rather than pure development of the financial 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 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 examined the impact of financial development in general and stock markets on unemployment. Despite these variations, the outcome is expected to shed some light on the relationship of interest (bank development and unemployment).

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 impact of financial development on unemployment – 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)

Author(s)	Study country/region	Financial development proxy	Data type	Nature of impact
Direct impact of financial development on unemployment – 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
Direct impact of financial development on unemployment – 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	Time-series	Insignificant (in the short run)

Author(s)	Study country/region	Financial development proxy	Data type	Nature of impact
		– Credit issued by financial institutions to the non-financial private sector as a share of GDP		
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 impact of financial development on unemployment – 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

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 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.

4. Estimation Method

4.1 ARDL Bounds Testing Approach

The objective of this study is to empirically assess the impact of the banking sector development on the 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 most known conventional estimation procedures such as those anchored on Johansen and Juselius (1990) and Johansen (1988) and Engle and Granger (1987), among others, the ARDL approach offers a number of benefits. The most prominent ones being its non-restrictive order of integration (Musakwa and Odhiambo 2019; use of a single reduced-form equation (see also Duasa 2007); .automatically address of 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); and possession of superior small sample properties, which makes it suitable even when the sample size is small (Pesaran and Shin 1999; Odhiambo and Nyasha 2020).

4.2 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 are chosen. These are key determinants of unemployment, based on theoretical and empirical literature (see, among others, Folawewo and Adeboje 2017) – such that:

UNE = F(y, BDV, FDI, DIN, HFC, GNE, INR. EXR)……(1)

Where each banking development proxy enters the model at a time.

Where **UNE** is unemployment, proxied by unemployment rate, total (% of total labour force) and is based on national estimates; **BDV** is bank development, proxied by DCP, LLB, BDP, BAS and BDI; **DC**P is domestic credit to private sector by banks, measured by domestic credit to private sector by banks is 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 mean-removed average approach following Nyasha and Odhiambo (2016); **y** is economic growth, proxied by annual percentage growth rate of GDP at market prices based on constant 2010 U.S. dollars**; 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 (World Bank 2020).

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

$$\Delta UNE_t = \phi_0 + \sum_{i=1}^{n} \phi_{1i}\Delta UNE_{t-i} + \sum_{i=0}^{n} \phi_{2i}\Delta BDV_{t-i} + \sum_{i=0}^{n} \phi_{3i}\Delta y_{t-i} + \sum_{i=0}^{n} \phi_{4i}\Delta FDI_{t-i}$$
$$+ \sum_{i=0}^{n} \phi_{5i}\Delta DIN_{t-i} + \sum_{i=0}^{n} \phi_{6i}\Delta HFC_{t-i} + \sum_{i=0}^{n} \phi_{7i}\Delta GNE_{t-i}$$
$$+ \sum_{i=0}^{n} \phi_{8i}\Delta INR_{t-i} + \sum_{i=0}^{n} \phi_{9i}\Delta EXR_{t-i} + \phi_{10}UNE_{t-1} + \phi_{11}BDV_{t-1} + \phi_{12}y_{t-1}$$
$$+ \phi_{13}FDI_{t-1} + \phi_{14}DIN_{t-1} + \phi_{15}HFC_{t-1} + \phi_{16}GNE_{t-1} + \phi_{17}INR_{t-1}$$
$$+ \phi_{18}EXR_{t-1} + \mu_{1t} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (2)$$

Where:

UNE = unemployment;

BDV = bank development, where DCP, LLB, BDP, BAS AND BDI enter the equation one at a time, substituting BDV;

DCP = domestic credit to private sector by banks;

LLB = liquid liabilities;

BDP = bank deposits;

BAS = deposit money bank assets;

BDI = banking development index;

y = economic growth;

FDI = foreign direct investment;

DIN = domestic investment;

HFC = household final consumption expenditure;

GNE = national expenditure;

INR = interest rate;

EXR = exchange rate;

ϕ_0 = constant;

ϕ_{1i}- ϕ_{9i} and ϕ_{10}- ϕ_{18} = respective regression coefficients;

Δ = the difference operator;

n = the lag length; and

μ_{1t} = the white noise-error term.

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

$$\Delta UNE_t = \phi_0 + \sum_{i=1}^{n} \phi_{1i} \Delta UNE_{t-i} + \sum_{i=0}^{n} \phi_{2i} \Delta BDV_{t-i} + \sum_{i=0}^{n} \phi_{3i} \Delta y_{t-i} + \sum_{i=0}^{n} \phi_{4i} \Delta FDI_{t-i}$$
$$+ \sum_{i=0}^{n} \phi_{5i} \Delta DIN_{t-i} + \sum_{i=0}^{n} \phi_{6i} \Delta HFC_{t-i} + \sum_{i=0}^{n} \phi_{7i} \Delta GNE_{t-i}$$
$$+ \sum_{i=0}^{n} \phi_{8i} \Delta INR_{t-i} + \sum_{i=0}^{n} \phi_{9i} \Delta EER_{t-i} + \varphi ECM_{t-1} + \mu_t \ldots\ldots\ldots\ldots (3)$$

Where:

ECM = the error correction term

φ = coefficient of the error correction term

All the other variables and characters remain as described under Equation 2,

5. Results

5.1 Stationarity

Three unit root tests were utilised in this study – namely: the Augmented Dickey-Fuller, the Dickey-Fuller generalised least squares; and the Phillips-Perron unit root tests – where the later 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.

Table 2: Results of Unit Root Test

	Unit root test	**At level**		**At first difference**	
		Intercept	**Intercept &Trend**	**Intercept**	**Intercept &Trend**
UNE	Augmented Dickey-Fuller (ADF)	-2.1966	-3.3079	-3.3730***	-4.4028***
	Dickey-Fuller generalised least squares (DF-GLS)	-1.4264	-2.2058	-3.2906***	-3.8474***
	Phillips-Perron (PP)	-1.8235	-2.2731	-3.7457***	-4.3838***
DCP	Augmented Dickey-Fuller (ADF)	-1.9502	-2.4730	-6.2298***	-6.1669***
	Dickey-Fuller generalised least squares (DF-GLS)	-1.5563	-2.6633	-5.9702***	-6.3248***
	Phillips-Perron (PP)	-1.8784	-2.5175	-6.2153***	-6.1963***
LLB	Augmented Dickey-Fuller (ADF)	-3.5024**	-4.4956***	-	-
	Dickey-Fuller generalised least squares (DF-GLS)	-2.2532**	-2.7165	-	-6.0450***
	Phillips-Perron (PP)	-3.5917**	-3.0264	-	-6.6676***
BDP	Augmented Dickey-Fuller (ADF)	-2.6148	-1.2401	-3.7396***	-4.2883**
	Dickey-Fuller generalised least squares (DF-GLS)	-0.7888	-1.3022	-3.8085***	-4.4154***
	Phillips-Perron (PP)	-2.4666	-1.3800	-3.7221***	-4.2883***
BAS	Augmented Dickey-Fuller (ADF)	-1.4172	-4.5591***	-3.7120***	-
	Dickey-Fuller generalised least squares (DF-GLS)	-0.1306	-3.0116	-3.7601***	-5.0356***
	Phillips-Perron (PP)	-1.3406	-1.9226	-3.7513***	-3.7120***
BDI	Augmented Dickey-Fuller (ADF)	2.1092	-1..7012	-5.2925***	-5.4178***
	Dickey-Fuller generalised least squares (DF-GLS)	-0.8994	-1.8628	-4.6913***	-5.4781***
	Phillips-Perron (PP)	-2.1090	-2.1452	-5.2893***	-5.4127***
y	Augmented Dickey-Fuller (ADF)	-3.0960**	-4.5386***	-	-

	Unit root test	At level		At first difference	
		Intercept	**Intercept &Trend**	**Intercept**	**Intercept &Trend**
	Dickey-Fuller generalised least squares (DF-GLS)	-2.9393***	-4.7097***	-	-
	Phillips-Perron (PP)	-3.0608**	-4.8235***	-	-
FDI	Augmented Dickey-Fuller (ADF)	-3.7493***	-4.2088**	-	-
	Dickey-Fuller generalised least squares (DF-GLS)	-3.7240***	-4.3724***	-	-
	Phillips-Perron (PP)	-3.7467***	-4.0949**	-	-
DIN	Augmented Dickey-Fuller (ADF)	-2.3965	-2.6034	-5.4564***	-5.4005***
	Dickey-Fuller generalised least squares (DF-GLS)	-2.4342**	-2.6336	-	-5.2864***
	Phillips-Perron (PP)	-2.4273	-2.6188	-5.9304***	-5.9136***
HFC	Augmented Dickey-Fuller (ADF)	-2.0926	-2.1164	-4.1685***	-4.0810***
	Dickey-Fuller generalised least squares (DF-GLS)	-0.9765	-1.9222	-3.7033***	-4.0885***
	Phillips-Perron (PP)	-2.2708	-1.9978	-4.1297***	-3.9997**
GNE	Augmented Dickey-Fuller (ADF)	-1.7717	-2.0132	-5.2658***	-5.3155***
	Dickey-Fuller generalised least squares (DF-GLS)	-1.3077	-2.1264	-5.0858***	-5.3954***
	Phillips-Perron (PP)	-1.6899	-2.0132	-5.3847***	-7.3744***
INR	Augmented Dickey-Fuller (ADF)	-1.1588	-2.4655	-5.2669***	-5.2044***
	Dickey-Fuller generalised least squares (DF-GLS)	-1.2106	-4.1452***	-3.4523***	-
	Phillips-Perron (PP)	-1.2566	-2.6441	-5.2733***	-5.2061***
EXR	Augmented Dickey-Fuller (ADF)	-2.2167	-3.1509	-4.9089***	-4.9856***
	Dickey-Fuller generalised least squares (DF-GLS)	-0.6339	-2.6082	-4.9751***	-5.1892***
	Phillips-Perron (PP)	-2.2256	-3.1502	-4.9093***	-4.9812***

Note: ** and *** denote stationarity at 5% and 1% significance level

The results of the stationarity tests conducted in this study, as shown in Table 2, reveal that most variables are conclusively stationary in first difference while a selected few, such as economic growth (y) and foreign direct investment (FDI) are conclusively stationary in 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.

5.2 Cointegration

The cointegration results are presented in Table 3.

Table 3: Bounds Test F-test for Cointegration

Dependent variable	**Function**				**F-statistic**	**Cointegration 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
	Asymptotic critical value					
Pesaran, Shin, and Smith (2001), p. 300, Table CI(iii), Case III	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

Note: ** and *** denotes significance at 5% and 1% levels.

As displayed 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.

5.3 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 the coefficient results. While Panel I of the table presents long-run results, Panel II exhibits short-run results.

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

Function	**BDV = DCP**	**BDV = LLB**	**BDV = BDP**	**BDV = BAS**	**BDV = BDI**
Optimal ARDL model	ARDL(1,0,0,0,1,1,1,0,0)	ARDL(1,0,1,0,1,1,1,0,0)	ARDL(1,0,1,1,1,1,1,0,1)	ARDL(1,0,1,1,1,1,1,0,0)	ARDL(1,0,1,0,1,1,1,0,0)
Regressor	Coefficient (t-ratio)	Coefficient (t-ratio)	Coefficient (t-ratio)	Coefficient (t-ratio)	Coefficient (t-ratio)
Panel I: Long-run coefficients; Dependent variable is UE					
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)

Function	**BDV = DCP**	**BDV = LLB**	**BDV = BDP**	**BDV = BAS**	**BDV = BDI**
Optimal ARDL model	ARDL(1,0,0,0,1,1,1,0,0)	ARDL(1,0,1,0,1,1,1,0,0)	ARDL(1,0,1,1,1,1,1,0,1)	ARDL(1,0,1,1,1,1,1,0,0)	ARDL(1,0,1,0,1,1,1,0,0)
Regressor	Coefficient (t-ratio)	Coefficient (t-ratio)	Coefficient (t-ratio)	Coefficient (t-ratio)	Coefficient (t-ratio)
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)
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)

Function	**BDV = DCP**	**BDV = LLB**	**BDV = BDP**	**BDV = BAS**	**BDV = BDI**
Optimal ARDL model	ARDL(1,0,0,0,1,1,1,0,0)	ARDL(1,0,1,0,1,1,1,0,0)	ARDL(1,0,1,1,1,1,1,0,1)	ARDL(1,0,1,1,1,1,1,0,0)	ARDL(1,0,1,0,1,1,1,0,0)
Regressor	Coefficient (t-ratio)	Coefficient (t-ratio)	Coefficient (t-ratio)	Coefficient (t-ratio)	Coefficient (t-ratio)
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)
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
S.E. 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: *, ** and *** denote 10%, 5% and 1% significant levels, respectively; Δ = first-difference operator.

As revealed in Table 4, Panel I and Panel II, 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 et al. (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 (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 (BDI) has shown that overall, 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 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 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 significant at 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. The results are displayed in Table 5.

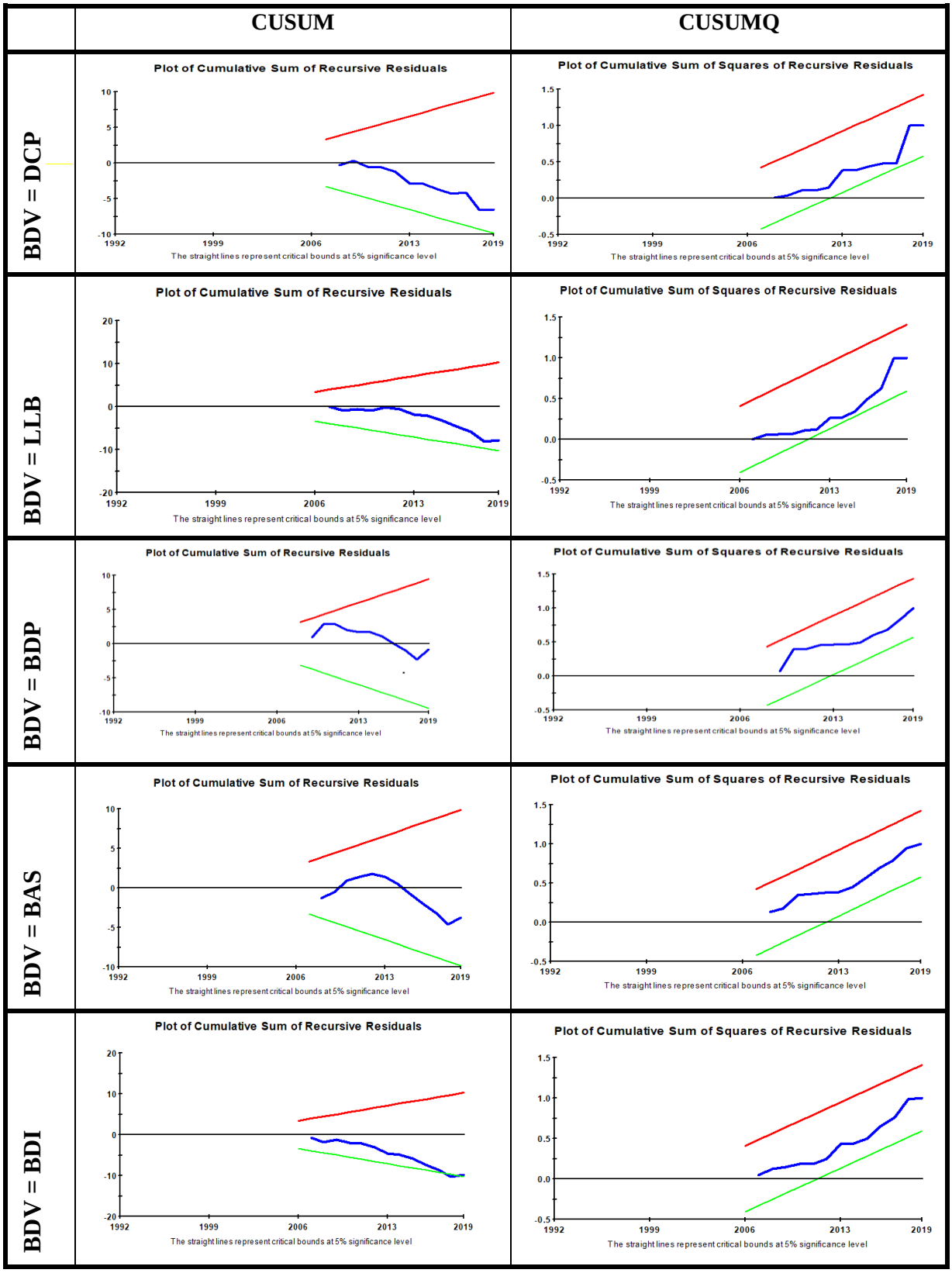
Table 5: Results of Diagnostic Tests

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]

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 5% significance level, irrespective of the proxy of bank development used. These graphs are displayed in Figure 2.

Figure 2: Plot of CUSUM and CUSUMQ



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 on 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 hand. It has become imperative to establish if these both 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 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 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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