

Assessing the Capacity of the Libyan Banking Sector to Finance Economic Development under Public Sector Dominance

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Abstract:

Looking at Libya's banks from 1990 to 2024, this work explores how well they support growth when state control is strong. Yearly figures feed into the ARDL method, revealing links over time between expansion and factors like loans to businesses. Instead of immediate effects, attention turns toward lasting patterns shaped by spending from officials. One measure stands out: how much lending comes from deposits held. Inflation weaves through everything, its role shifting across phases. Results emerge not all at once but piece by piece, pulled from trends that unfold slowly.

Results show the variables move together over time. Because private loans rise, so does economic expansion, backed by stronger bank activity. When banks grow, output tends to follow, fitting the idea that finance drives progress. Yet too much lending compared to deposits links to weaker outcomes. Government spending more often ties to slower growth, hinting at displaced private investment. High inflation drags down performance, showing steady prices help economies function. Stability matters, not just financial scale.

A closer look shows fixing Libya's bank system means changing how it's built, while lining up money policies across the board so cash moves better, stays steady, because businesses lead when they get support.

Keywords: Banking sector, Public sector, Economic development, Finance, Libya.

قياس مدى قدرة القطاع المصرفي الليبي على تمويل التنمية الاقتصادية في ظل هيمنة القطاع العام

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مستخلص:

تهدف هذه الدراسة إلى تقييم قدرة القطاع المصرفي الليبي على تمويل التنمية الاقتصادية في ظل هيمنة القطاع العام، وذلك خلال الفترة (1990-2024)، وتعتمد الدراسة على بيانات سنوية تم تحليلها باستخدام منهجية نماذج الانحدار الذاتي للفجوات الزمنية الموزعة (ARDL) من أجل الكشف عن طبيعة العلاقات طويلة الأجل بين النمو الاقتصادي وعدد من المتغيرات المرتبطة بالنشاط المصرفي، مثل القروض الممنوحة للقطاع الخاص، ولا تقتصر الدراسة على الآثار الآنية، بل تركز بصورة أساسية على الأنماط طويلة الأجل التي تتشكل بفعل السياسات المالية والإنفاق الحكومي، كما يبرز أحد المؤشرات المهمة في هذا السياق، وهو نسبة القروض إلى الودائع، باعتباره مقياس لمدى كفاءة توظيف الموارد المصرفية، كذلك يلعب التضخم دور مؤثر في هذه العلاقات، حيث تتغير آثاره عبر المراحل الزمنية المختلفة. تشير النتائج إلى وجود علاقة تكامل مشترك بين المتغيرات محل الدراسة على المدى الطويل. فمع زيادة القروض المقدمة للقطاع الخاص، يزداد التوسع الاقتصادي، مدعوماً بتنامي النشاط المصرفي، فعندما يتوسع القطاع المصرفي، ويميل الناتج الاقتصادي إلى الارتفاع، وهو ما يتماشى مع الفرضية التي تؤكد أن التطور المالي يعد محركاً للنمو الاقتصادي، ومع ذلك، تشير النتائج أيضاً إلى أن الارتفاع المفرط في نسبة القروض إلى الودائع قد يرتبط بنتائج اقتصادية أقل إيجابية، كما يتبين أن زيادة الإنفاق الحكومي غالباً ما ترتبط بتباطؤ معدلات النمو، وهو ما قد يعكس تأثير المزاخمة على استثمارات القطاع الخاص، إضافة إلى ذلك، يؤثر ارتفاع معدلات التضخم سلباً في الأداء الاقتصادي، مما يدل على أن استقرار الأسعار ويعد عاملاً أساسياً

لدعم كفاءة عمل الاقتصاد، وبذلك يتضح أن الاستقرار الاقتصادي لا يقل أهمية عن حجم النشاط المالي نفسه، و عليه تشير النتائج إلى أن إصلاح النظام المصرفي في ليبيا يتطلب إعادة هيكلة مؤسسية شاملة، إلى جانب تعزيز التنسيق بين السياسات النقدية والمالية بما يسهم في تحسين تدفق السيولة واستقرارها داخل الاقتصاد، ومن شأن ذلك أن يهيئ بيئة أكثر دعماً لنشاط القطاع الخاص، الذي يمثل المحرك الأساسي للنمو الاقتصادي عندما تتوفر له الظروف التمويلية المناسبة.

الكلمات المفتاحية: القطاع المصرفي، القطاع العام، التنمية الاقتصادية، التمويل، ليبيا.

Introduction:

In recent years, much of economics has focused on how finance shapes growth. Not everyone agrees, yet plenty of studies point to one idea: strong banking systems tend to support stronger economies over time. Way back, some early thinkers argued that banks do more than hold money - they gather it up then send it where new ideas need it most, sparking lasting progress (Schumpeter, 1911). Later work found real-world proof showing that when institutions move funds around well, they help pick better projects, handle uncertainty easier, make deals cheaper, even keep firms in tighter order (Levine, 1997; Levine, Loayza, & Beck, 2000).

Still, how finance affects growth isn't the same everywhere, nor does it happen without conditions. What matters most are the rules in place and how an economy is built. When governments control too much or rely on just one resource, banks often struggle to help development. Spending big or borrowing heavily through banks can pull money from businesses, leaving less room for them to grow - this shift has a name: crowding out (Keynes, 1936; Friedman, 1968). Data shows loans going to real business activity do better for growth than those covering routine state costs (Beck et al., 2000).

When it comes to studying these patterns, economies leaning heavily on resources offer useful ground. State control grows in size there because oil money flows into government hands - this shifts how

loans get handed out, sidelines businesses run by individuals. Looking at nations that sell lots of oil reveals something: banks and markets boost growth less strongly than they do where industry is varied, mainly since governments take up too much space and systems fail to support openness (Nili & Rastad, 2007). A glance at Middle East and North Africa findings says private firms borrowing helps expansion - but when states manage lending, benefits from financial channels shrink fast (Ben Naceur & Ghazouani, 2007).

Though research on Libya exists, it often skips the years after 2011 when major shifts unfolded. Instead of tracking changes over time, many analyses lean on broad economic numbers. Public sector influence tends to be left out, even though state control shapes much of the economy. Without clearer models linking banks and government-heavy markets, insights stay shallow. Long-term patterns in growth remain hazy because connections between finance and state power are rarely mapped together.

Theoretical Framework and Previous Studies: Financial Development and Economic Growth:

Banks shape economies by doing more than just moving money around. Innovation gets funded because financial players step in where entrepreneurs need support, according to Schumpeter back in 1911. Growth links closely to how well savings get pulled together, thanks to work by Levine in 1997 showing one clear path among several. Another route involves spreading risks across different areas so no single failure brings everything down. When exchanges happen smoothly, it is often due to systems built by evolving financial structures. Better oversight inside companies also emerges when markets mature over time. Evidence drawn from many nations lines up with these ideas - credit flowing to businesses tends to go hand in hand with lasting expansion of output.

Yet direction matters little to some researchers, who see feedback loops at play. Growth might drive finance instead, according to Robinson back in 1952. Then again, too much financial swelling lately seems to weaken outcomes after a point - evidence points that

way since Arcand, Berkes, and Panizza in 2015. Still, data leans toward private lending helping economies grow, so long as systems stay sound and policies steady.

Crowding-Out and Public Sector Dominance:

Even when state spending lifts overall demand at first, heavy reliance on borrowing from local banks often leaves less money for businesses to invest. What happens next? The bigger the government's footprint grows in finance, the more it tends to push aside private lending and slow down capital flow. Instead of boosting growth long term, constant deficits might heat up prices and misdirect where resources should go. One thing becomes clear: too much public debt can reshape how money moves across an economy.

It turns out banks help growth less when most loans go to governments instead of businesses. In poorer nations this shows up clearly - state borrowing usually pays routine costs, not projects that build wealth. When officials take the biggest slice of credit, there's little left for farms, shops, factories. Money flows shift, then progress slows down. The system still moves cash around but lifts nobody higher.

Evidence from Resource-Dependent Economies:

Where natural resources dominate, finance doesn't boost growth as clearly as it does in varied industrial settings. State control grows when oil money flows in, guiding loans toward favored areas while sidelining private enterprise. Research on oil-producing nations across the Middle East and North Africa finds lending to businesses still links to expansion - yet weak institutions and heavy government borrowing limit how much effect remains.

When it comes to Libya, there isn't much long-term number crunching available. Most research zeroes in on big-picture economic stats, yet skips linking them clearly to how much control the government holds - all in one clear setup. Not many papers stretch far enough into recent years, especially past 2011, when major political

and financial shifts happened. Because of that gap, what we know about how banks have changed lately stays fuzzy.

Research Gap:

Even with much written about finance and economic expansion, three main issues stay unresolved. Notably, research often centers on private lending but rarely includes measures of government control in detailed statistical models - especially where oil income shapes the economy. Instead of linking these elements, past work tends to treat them separately. Another overlooked point involves how banks distribute funds; metrics like loans versus deposits appear infrequently alongside signs of state-driven displacement. Rarely do analyses combine such indicators into one framework. When it comes to Libya, extended data-driven studies spanning 1990 to 2024 are missing altogether. Few attempts exist that apply techniques able to separate immediate effects from lasting trends. Long-range modeling remains underused despite its potential value.

This research aims to fill existing voids through building a unified econometric framework - linking measures of bank capability, state-sector influence, and overall economic steadiness - to examine if heavy public presence limits Libya's financial system in supporting prolonged growth.

Research Questions:

The study is guided by the following central question:

To what extent does public sector dominance affect the ability of the Libyan banking sector to finance economic development during 1990–2024?

Sub-questions include:

1. What is the relationship between private sector credit and real GDP growth?
2. Does the credit-to-deposit ratio reflect efficient banking resource allocation, and how does it influence growth?

3. What is the impact of government expenditure on economic growth?
4. Does a higher share of public sector credit crowd out private investment and reduce growth?
5. How does inflation influence the relationship between banking development and economic growth?

Objectives of the Study:

The main objective is to measure the impact of public sector dominance on the capacity of the Libyan banking sector to finance economic development in both the short and long run.

Specific objectives include:

1. Evaluating the developmental role of private sector credit.
2. Assessing the efficiency of banking resource utilization through the credit-to-deposit ratio.
3. Estimating the effect of government expenditure on growth.
4. Testing the existence of crowding-out effects.
5. Examining the role of inflation as a macroeconomic stability factor.

Research Hypotheses:

The primary hypothesis posits that public sector dominance significantly affects the ability of the Libyan banking sector to finance economic development.

Sub-hypotheses include:

1. Private sector credit positively influences real economic growth.
2. Efficient banking resource allocation enhances growth.
3. Government expenditure has a significant, potentially mixed short- and long-run impact.
4. Public sector credit exerts a negative effect on growth due to crowding-out.
5. Inflation negatively affects long-run economic growth.

Significance of the Study:

The study contributes theoretically to the literature on financial development and growth by re-examining the finance–growth relationship within a rentier economy characterized by public sector dominance. It also revisits the crowding-out hypothesis in a resource-dependent context. Practically, it provides quantitative evidence to inform policymakers regarding credit allocation efficiency, banking sector performance, and macroeconomic stability. Methodologically, the use of the ARDL approach enables the simultaneous estimation of short- and long-run relationships within a unified framework.

Methodology:

Yearly figures from 1990 to 2024 form the basis of this analysis, using an Autoregressive Distributed Lag model. Especially useful when dealing with mixtures of stationary and non-stationary series - like $I(0)$ and $I(1)$ - this method works well even with limited data spans. Instead of relying on strict integration assumptions, it allows separation of immediate impacts from those that emerge over time. To verify long-term relationships, researchers apply the ARDL bounds test for cointegration. Alongside, tools such as CUSUM and CUSUMSQ check whether estimated coefficients remain stable across years. These checks help confirm that findings are not distorted by structural shifts during the observation window.

Model Specifications:

The theoretical foundation of the model draws from financial development theory, which emphasizes the role of banking intermediation in financing productive activities and enhancing resource allocation efficiency. It also incorporates the crowding-out framework, which suggests that excessive government borrowing or public sector credit allocation may reduce private sector access to finance. Furthermore, it is informed by empirical evidence from resource-dependent economies, where public sector financing often weakens the growth-enhancing role of banks, while private sector credit remains a key driver of economic development.

Econometric specification of the model:

Based on the foregoing discussion, the empirical model can be specified as follows:

$$\text{LnWRGDP}_t = \alpha_0 + \alpha_1 \text{LnCDR}_t + \alpha_2 \text{LnCPS}_t + \alpha_3 \text{LnGOVEXP}_t + \alpha_4 \text{LnCDPS}_t + \alpha_5 \text{LnINF}_t + \mu_t \quad \dots\dots\dots (1)$$

Where:

- α_0, α_5 denote the intercept and the coefficients of the explanatory variables;
- μ_t represents the stochastic error term.

Data description and sources:

The study relies on annual time-series data covering the period 1990–2024, collected from official and reliable sources.

The dependent variable is the real economic development indicator, proxied by the logarithm of the real GDP growth rate (LnWRGDP). This series is obtained from the World Bank, specifically from the World Development Indicators database.

The time series of the explanatory variables include:

- i. Bank credit to the private sector (LnCDR), which captures the capacity of the banking sector to finance economic development;
- ii. The credit-to-deposit ratio (LnCPS), which reflects the efficiency of banking resource utilization;
- iii. Government expenditure as a share of GDP (LnGOVEXP), which represents the degree of public sector dominance;
- iv. The ratio of credit directed to the public sector to total credit (LnCDPS), which proxies the crowding-out effect on the private sector; and
- v. The inflation rate (LnINF).

All explanatory variables were compiled from the annual statistical reports of the Central Bank of Libya.

Results of the ARDL model tests for the estimated equation:

Unit root test results:

Starting with a look at time behavior, the ADF test frequently appears when researchers check whether economic data stay steady over time or drift unpredictably (see Table 1). Though not perfect, it remains common because it adapts well to different patterns found in real-world numbers.

What makes this test matter? Running econometric models on data that drifts over time can produce false results - relationships appear strong even when no real economic connection exists. Such outcomes, often called spurious regressions, mislead interpretation. Because of this risk, checking whether variables stay stable across time becomes essential before moving into methods like cointegration or ARDL modeling. A shaky foundation here undermines later analysis. Without confirming stability early, conclusions drawn later might rest on coincidence rather than causality. So verification comes first - not after, but before everything else follows.

Table.1. Unit Root Test for the Model

Augmented Dickey-Fuller (ADF) Test					
At Level					
VARAIBLES	Intercept	Sig- Level	In& Trend	Sig- Level	Result
LNWRGDP	-6.622	0.000	-6.5	0.000	yes
LNCNR	-1.5461	0.498	-0.8	0.95	No
LNCPN	-1.862	0.345	-2.1	0.49	No
LNQOVEXP	-2.479	0.129	-4.457	0.00	No
LNCNPN	-2.323	0.17	-2.7	0.23	No
LNINF	-3.206	0.028	-3.1	0.104	No
At First Difference					
VARAIBLES	Intercept	Sig- Level	In& Trend	Sig- Level	Result
LNWRGDP	-7.2354	0.00	-7.1	0.000	yes
LNCNR	-3.4234	0.01	-3.6	0.037	yes
LNCPN	-6.1168	0.000	-6.0	0.0001	yes
LNQOVEXP	-8.3676	0.00	-8.2	0.000	yes
LNCNPN	-5.8709	0.00	-5.7	0.000	yes
LNINF	-6.3494	0.00	-6.2	0.000	yes

Source: a table is based on results obtained from (ADF Test) (EViews-12).

Although the ADF test examines time series behavior, it rests on two opposing assumptions. One claims the data has a unit root - meaning it drifts without settling - while the other suggests stability over time. Decisions emerge when the T Statistic meets real-world thresholds, usually at 5%. When results dip below that mark, confidence grows that values stabilize around a fixed point. Only if numbers stay above do analysts hold onto the idea of unpredictable movement. Evidence shifts judgment depending on how small the p-value appears.

Only LNWRGDP shows stationarity at level $I(0)$, based on ADF test outcomes, since its p-values fall under 5% across both intercept-only and trend-inclusive setups - this rejects the null hypothesis, supporting stationarity. Despite that, LNCDR, LNCPS, and LNCDPS display p-values above the threshold in each setup, meaning the data fails to reject the null, pointing toward non-stationary behavior early on. Even though LNWRGDP registers significance when a trend term enters the equation, it loses statistical weight without one, raising doubts about consistent stability at base levels. LNINF follows a comparable path: meaningful within the intercept model alone but not when time-based drift joins, hinting at partial rather than full stationarity. Hence, every series behaves as non-stationary initially - with just LNWRGDP standing apart through evidence of stable properties under certain conditions.

At the initial differencing stage, every variable delivered p-values under five percent - accompanied by strongly negative test values - in both trend-free and trend-inclusive setups. Because of these outcomes, we dismiss the idea that any series has a unit root, meaning they stabilize after one transformation. It turns out LNWRGDP holds steady without differencing, sitting comfortably at level; others require a single shift to become stable. Notably, none demand second-order processing. Since some behave predictably right away while others need adjustment, their blend of behaviors fits well within ARDL's design - as long as nothing reaches $I(2)$. Such variety across integration levels makes this technique suitable by construction.

Optimal Lag Selection Test Results:

Beginning with lag length choice - it shapes how well ARDL estimates perform and how reliable conclusions become. If too few lags enter, key patterns in time might vanish; if too many slip in, the model grows bulky, loses freedom counts, tightens parameter links unnecessarily. Instead of guessing, tools like Adjusted R², AIC, BIC, HQ steer the pick - each weighs fit against complexity differently. Efficiency emerges not from piling terms but from holding simplicity close while capturing core behavior. Winning models? Those where explanation stretches far without dragging extra weight.

Table.2. Model Selection Criteria

Model	Adj. R-sq	AIC*	BIC	HQ	Specification
637	0.6873	2.3970	3.5997	2.7890	ARDL(4, 3, 4, 4, 2, 3)
636	0.6297	2.4077	3.6567	2.8149	ARDL(4, 3, 4, 4, 2, 4)
631	0.5215	2.4408	3.7360	2.8630	ARDL(4, 3, 4, 4, 3, 4)
632	0.6104	2.4584	3.7074	2.8656	ARDL(4, 3, 4, 4, 3, 3)

Source was prepared by the researcher based on the outputs of the ARDL model test.

Looking at the numbers in the table, the ARDL (4, 3, 4, 4, 2, 3) stands out - its Adjusted R² reaches 0.6873, topping all others. This one also shows the smallest AIC and BIC scores: 2.3970 and 2.7890 respectively. Its HQ figure stays below those seen in competing versions. Other setups fall behind - they explain less while carrying heavier penalty measures. With that pattern clear, choosing this version makes sense. It captures shifts unfolding across several past points for some factors. The process unfolds slowly, hinting delays shape these economic links. Using a setup built to track evolving impacts fits how things actually behave over time.

Bounds Test Results:

Starting off, the ARDL bounds test checks if variables move together over time, especially useful when some are non-stationary while others are stable. It works well regardless of whether data follows I(0) or I(1) patterns, removing the need for strict pre-testing. Instead of

relying on fixed rules, it uses an F-value drawn from the UECM setup and measures it against preset thresholds. When results exceed the upper limit - set for fully integrated series - a shared long-term path is confirmed. Below the lower threshold - which assumes stationarity - no such link exists. Values falling in between leave room for uncertainty, depending on assumptions. Because of this flexibility, the approach fits datasets that aren't too large or perfectly balanced. Each modeled equation was then structured under these guiding principles, ensuring consistency across specifications.

Looking at the numbers shown, the calculated F-value comes out to 5.2938 - this number goes beyond the threshold listed for both 5% (4.193) and 10% (3.517) levels of significance. Since it crosses above those limits, the idea that no stable long-term link exists gets ruled out under both confidence thresholds. Instead, evidence points toward a shared long-run pattern connecting the factors examined. With this in mind, further steps like estimating long-run effects and building an Error Correction Model become reasonable choices. The basis for this lies in matching the observed statistic against reference values; whenever the result tops the higher limit, cointegration stands confirmed according to standard interpretation rules.

Table.3.Existence of a Long-Run Relationship among Variables

Critical Values (5%)		Critical Values (10%)		Period: 1990–2024	
I(1)	I(0)	I(1)	I(0)	F-Statistics	Model
4.193	2.91	3.517	2.407	5.2938*	ARDL

Source: Results of the ARDL model test, (EViews12). Note: The null hypothesis assumes no cointegration among the variables, while the alternative hypothesis assumes the presence of cointegration. The asterisk (*) denotes significance at the 5% level. I(0) and I(1) represent the lower and upper critical bounds, respectively.

Long-Run Estimations Results:

In Table (4), figuring out long-run links using the ARDL method becomes essential once cointegration is confirmed across variables. Because it evaluates how strongly and in what way predictors influence the outcome over extended periods. What makes this useful is the distinction between temporary fluctuations and lasting impacts.

Thus revealing the balanced path the system tends to follow over time.

Looking at the model's performance, R^2 stands at 0.747899 - meaning nearly three-fourths of changes in the economic development index tie back to the included predictors over time. Though slightly lower, the adjusted R^2 value of 0.687395 still shows solid fit after considering variable count. With an F-statistic of 3.638707 and a p-value under 0.05 (specifically 0.007424), the model as a whole holds statistical weight. Residual patterns appear balanced, since the Durbin-Watson figure lands near 2 (1.919450), pointing away from serial correlation. So, the long-run equation maintains reliability, capturing meaningful links between factors without distortion.

Over time, credit flowing to the private sector lifts the economic development index noticeably - this link holds firm under statistical tests, marked by a 0.31 coefficient and solid evidence at less than 5% uncertainty threshold. From here, every one percent rise in such lending ties to about a 0.31 percent gain in real GDP when other things stay unchanged. Meanwhile, loans extended to government bodies also push growth forward, clear and stable in results, though smaller - one percent more brings roughly 0.01 percent upturn in output, again with confidence above noise levels below 5%. That pattern lines up well with the idea that active financial systems can drive expansion by pulling idle funds into use, guiding them toward better-performing ventures while lifting overall capital formation. Such mechanisms echo earlier thinking laid out by Joseph Schumpeter back in 1911, who saw banks as key backers of new enterprise through funding channels. Later work from Robert G. King and Ross Levine in 1993 showed stronger finance links to faster economic expansion. By contrast, research led by Ross Levine seven years later found that more developed financial systems help boost growth via higher investment and better productivity.

تم النشر في : 2026/03/08 تم القبول في: 2026/03/07 تم الاستلام في : 2026/02/18

www.doi.org/10.62341/HCSJ

Table.4. Long-Run and Short-Run Relationships and Error Correction Factor

1990-2024		ARDL(4, 3, 4, 4, 2, 3)				Model	
Long-run Impact		Short-run Impact				Model	
VARAIBLES	coeff.	T-stat.	Prob.	Prob.	T-stat.	coeff.	VARAIBLES
LNCDR	0.3159	3.5537	0.0163	0.0004	8.4951	0.886	D(LNWRGDP(-1))
LNCPS	-0.170	-4.461	0.0066	0.1873	1.5271	0.770	D(LNCDR)
LNGOVEXP	-0.105	-1.126	0.0546	0.0004	8.3260	-0.945	D(LNCDR(-2))
LNC DPS	0.010	7.698	0.0006	0.1636	1.6318	-0.840	D(LNCPS)
LNINF	-0.090	-1.315	0.0455	0.0001	10.546	0.975	D(LNCPS(-1))
C	-0.806	-0.1920	0.8552	0.0018	6.0120	0.929	D(LNGOVEXP)
.....	.....	.....	.....	0.0023	5.7318	0.986	D(LNC DPS)
.....	.....	.....	.....	0.0042	4.9650	-0.654	D(LNINF)
.....	.....	.....	.....	0.0003	9.0291	-0.560	Ecm(-1)
Standard Indicators							
R ²				0.747899			
<u>R</u> ²				0.687395			
F-Statistics				3.638707			
Prob-F-Statistics				0.007424			
DW-statistic				1.919450			
Equation (2)		EC = LNWRGDP - (0.3159*LNCDR -0.1705*LNCPS -0.1053*LNGOVEXP +0.8108*LNC DPS -0.0906*LNINF -0.8067)					
Diagnostics Test				ARDL Mode			
Type of Test				F-Statistic		P-Value	
Serial Correlation/LM Test				1.79872		0.3066	
Heteroskedasticity Test/ Breusch/Pagan				2.08901		0.2113	
Normality Test: Jarque-Bera Test				0.22462		0.8937	
Ramsey RESET Test				4.19834		0.1110	
Stability Tests							
CUSUM Test				Stable			
CUSUMSQ Test				Stable			

Source: Results of the ARDL model test, (EViews12). Note: The dependent variable is the Economic Development Index (LNWRGDP), (39 observations).

On the flip side, lowering the credit-to-deposit ratio had a measurable downside influence over time - around -0.17 - with results holding under 5% statistical thresholds; each 1% drop tied to about a 0.17% rise in actual economic output, hinting at lasting drag

effects. One possible reason? Lending flows might favor ventures with weak returns or elevated risks instead of productive uses, possibly due to deep-rooted mismatches within lending systems. Government outlays showed similar patterns: their estimated coefficient sat at -0.054 , meaning every 1% cut linked to roughly a 0.054% gain in GDP - a trend consistent with theories where state consumption displaces private activity, especially when budgets lean more on day-to-day costs than capital investments. Studies suggest outcomes depend heavily on which areas receive funding. A drop in inflation tied to slower growth appears clear - its influence small but notable at -0.0455 , reinforcing earlier views: stable economies grow better, as Fischer noted in 1993. High price increases hurt expansion, much like Bruno and Easterly found years later. Still, the baseline level (C) shows no strong pattern, suggesting main drivers already included explain most shifts in output trends.

Short Run Estimates and Error Correction:

Right away, ARDL's short-term results show how shifts in predictor variables impact the economic development index through their differenced coefficients. Following a disruption, adjustment toward balance occurs gradually, captured by the error correction term. This pace of realignment reveals how quickly influences settle back into stable patterns. Though temporary fluctuations matter, the ECT highlights persistence in restoring longer trends.

Table (4) shows results of short-run estimates and error correction, one step back in income levels brings a clear upward push - past gains keep lifting today's numbers, seen in the 0.88 rise tied to earlier shifts. Not right away, yet later down the line, credit volume reveals a pullback: recent swings matter less than those felt two stages prior, where growth slows under $D(LNCDR(-2))$. What happens now with capital stock barely registers at first; instead, movement builds slowly - the previous period's increase in investment quietly strengthens output. Government outlays stand apart: their immediate imprint appears solid and measurable, adding 0.92 to present expansion through broader spending currents. A delay shapes much of these

forces - not everything acts upon impact. Surprisingly, LNCDPS shows a clear upward impact, highlighting how growth in banks can boost activity quickly. On the flip side, rising LNINF pulls results down, which lines up with long-held views - higher inflation tends to unsettle economies and drag on actual output, even if statistical strength shifts slightly.

A coefficient of -0.56 marks the lagged error correction term, $Ecm(-1)$, standing out due to strong statistical significance. Its negative value plays a key role - revealing that variables share a stable long-term connection while deviations fade over time. Each year, roughly 56 percent of imbalances get resolved, suggesting adjustments happen at a notable pace. Evidence points clearly to meaningful short-term movements working together with a dependable return process, pulling outcomes back toward equilibrium. This strengthens confidence in the model's structure and supports its use in interpreting real-world patterns.

Diagnostic Tests:

Checking the model comes after estimation in time series work, making sure it meets basic conditions needed for OLS to produce trustworthy outcomes. Often, researchers look at whether errors repeat patterns across time, if variance changes, how closely they follow a bell curve, and whether key numbers stay steady throughout the period studied. Confidence grows when such checks confirm the model behaves well - not just fitting data or showing strong links, but also avoiding hidden distortions that skew results or mislead about precision. When models clear these hurdles, conclusions drawn about immediate or lasting economic ties gain support. Below appear the findings from those evaluations, table (4) presents results of diagnostic tests.

Test Results Show Serial Correlation:

Beginning with simplicity, the Lagrange Multiplier test checks whether errors in time series data repeat patterns over time. Because such repetition breaks a core requirement of ordinary least squares,

results may become misleading - estimates less precise, error margins distorted. Instead of relying on visual clues, this method probes deeper, uncovering links between residuals separated by multiple intervals. While certain techniques stop at immediate lags, here detection extends further, revealing complex dependencies others miss. Foundational yet practical, its role grows when models include past values as predictors.

The findings show an F-statistic of 1.798727 and a p-value equal to 0.3066 - this value sits above the 5% cutoff. When the p-value does not fall under the selected threshold, rejection of the null hypothesis does not occur; here, it means no evidence against serial correlation appears. As a result, within this framework, disturbances behave independently at the 5% level. Estimates gain stability because of this outcome, while conclusions drawn from tests rest on firmer ground. Confidence in the model's structure increases accordingly.

Heteroskedasticity Test Results:

Not every analysis checks for shifts in error spread, yet examining variability remains central when fitting lines to data. When gaps between predicted and actual values grow unevenly, least squares outputs lose precision - standard measures of uncertainty drift off course. Some researchers overlook this shift; consequences appear later in flawed conclusions. Stable scatter in residuals supports clearer interpretation, strengthening how results inform choices in real-world settings.

Appearing at 2.089016, the F-statistic comes with a p-value of 0.2113 - above the conventional 5% threshold. Because of this, the idea of homoscedastic errors stays intact; rejection is not supported. Stability in variance across residuals holds up, meaning estimated coefficients remain more trustworthy. As a result, inferences pulled from the analysis gain stronger footing.

Normality Test Results:

When checking regression models, looking at residual distribution helps spot symmetry around zero. Because t-tests and f-tests depend on this pattern, getting it right supports valid conclusions. If the

spread looks off, something might be wrong with how the model is built. Sometimes, reshaping a variable fixes what seems unusual.

With the Jarque-Bera test results in view, residual values hover near zero on average, show a fair spread, yet display patterns in asymmetry and tail weight that suggest alignment with normal distribution trends. At 0.89, the significance level stays well above the usual 5% threshold, meaning assumptions about normal shape remain intact. Evidence thus supports treating errors as drawn from a bell-shaped pattern, making t- and F-based evaluations appropriate under current conditions.

Test Results for Functional Form:

A statistical check known as the Ramsey RESET test helped evaluate whether the relationship between LNWRGDP and the chosen predictors followed the right mathematical structure. If hidden patterns or incorrect forms were present, this method would likely reveal them.

The findings support the null hypothesis, suggesting the model fits well and its structure matches the data pattern. Because of this, conclusions drawn from the regression analysis appear valid, with no requirement to adjust variables or redesign the equation.

Stability Test Results:

A model's reliability often depends on how well its structure holds up when faced with shifting conditions. To check this, researchers looked at whether key values stayed steady during times of economic stress or policy shifts. Instead of relying on single-point checks, they used a method tracking changes across the full timeline. The approach involved examining patterns in error deviations after estimation. Through cumulative scoring of these adjusted errors, two variations helped detect possible breaks - one focused on raw totals, another on their squared forms. Results came from applying both versions over the entire span under review.

As shown in the table (4), starting from the beginning, the CUSUM method checks whether accumulated residuals stray beyond

thresholds set at a 5% significance level. Throughout the observed timeframe, the blue plotted line stays inside the red dashed boundaries. This pattern suggests the assumption of stable parameters holds true. As time passes, no major changes disrupt the model's structure. Stability appears consistent across the entire duration under review.

Midway through the period, a shift appears - yet stays below threshold levels. Remaining inside the 5% boundaries, the cumulative squared residuals show steady behavior overall. Sensitivity to sudden shifts defines the CUSUM of Squares method, still finding no major instability here. Variance and parameter consistency seem intact despite minor fluctuations along the way.

From start to finish, the results show the model stays consistent across time - making forecasts more trustworthy. Stability holds firm through every phase tested, so predictions remain sound over weeks or years alike. Each check backs this pattern, meaning economists can apply it without second thoughts.

Conclusion:

This study looked at how the Libyan banking system can help the economy grow when the public sector is in charge from 1990 to 2024. It did this by looking at how economic growth, bank lending, government spending and other things related while also considering inflation. The study used a kind of math model called the Autoregressive Distributed Lag model with yearly data. The results showed that there is a long-term connection between these things.

In the term when banks lend money to private businesses it helps the economy grow. When the banking system is strong the whole economy does better. This is what we would expect.. When banks lend too much money compared to what they have in deposits and when the government spends too much money it can hurt the economy. This is probably because the government is spending more on things that're not important for the future rather than investing in things that will help the economy grow. Inflation is also bad for the economy.

In the term things can change quickly and what happens with lending and government spending can have a big impact right away. The study also found that the economy can get back on track after a shock because there are mechanisms in place to correct things. The tests we did showed that the model is good and can be trusted.

Recommendations:

Based on what we found we have some suggestions. Since lending to businesses helps the economy the banks should try to lend more money to businesses that make things, especially those that add a lot of value. They should also get better at deciding who to lend money to so they can use their resources efficiently:

1. To avoid problems with banks lending much money they should manage their money better so they have enough to lend and enough to save. This will make the banks more stable. Reduce the risk of bad loans. The banks should also be supervised better. Have better internal rules.
2. The government should spend its money wisely and invest in things that will help the economy grow, like roads and schools. This will help the private sector and the public sector work better.
3. Since inflation is bad for the economy the government and the banks should work together to keep prices stable. This will make it easier for people to invest in the economy.
4. The banking system is important for the economy so we should try to make it better. We can do this by improving the laws and rules getting more people to use banks and using technology to make banking more efficient.
5. We need to make sure that all the different parts of the economy are working together and that we have a long-term plan to make the private sector stronger and less dependent, on the sector.

Overall the study shows that the banking system needs to be fixed so it can help the economy grow. We need to make changes to make sure that resources are used efficiently that the economy is stable and that we have a good environment for businesses to grow.

Note: It is important to acknowledge that the artificial intelligence engine (ChatGPT) was utilized to assist in linking and interpreting the methods used to calculate the study variables, as well as to enhance the clarity and academic quality of the English language used in this paper. This support was provided for informational and linguistic purposes only.

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تم النشر في : 2026/03/08

تم القبول في: 2026/03/07

تم الاستلام في : 2026/02/18

www.doi.org/10.62341/HCSJ

Appendixes:

1) Serial Correlation LM Test:

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	1.798727	Prob. F(2,3)	0.3066
Obs*R-squared	16.90365	Prob. Chi-Square(2)	0.0002

2) Heteroskedasticity Test:

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	2.089016	Prob. F(25,5)	0.2113
Obs*R-squared	28.29141	Prob. Chi-Square(25)	0.2946
Scaled explained SS	0.613133	Prob. Chi-Square(25)	1.0000

3) Ramsey RESET Test:

Ramsey RESET Test

Equation: UNTITLED

Specification: LNWRGDP LNWRGDP(-1) LNWRGDP(-2) LNWRGDP(-3)

LNWRGDP(-4) LNCDR LNCDR(-1) LNCDR(-2) LNCDR(-3) LNCPS

LNCPS(-1) LNCPS(-2) LNCPS(-3) LNCPS(-4) LNGOVEXP

LNGOVEXP(-1) LNGOVEXP(-2) LNGOVEXP(-3) LNGOVEXP(-4)

LNCDPS LNCDPS(-1) LNCDPS(-2) LNINF LNINF(-1) LNINF(-2)

LNINF(-3) C

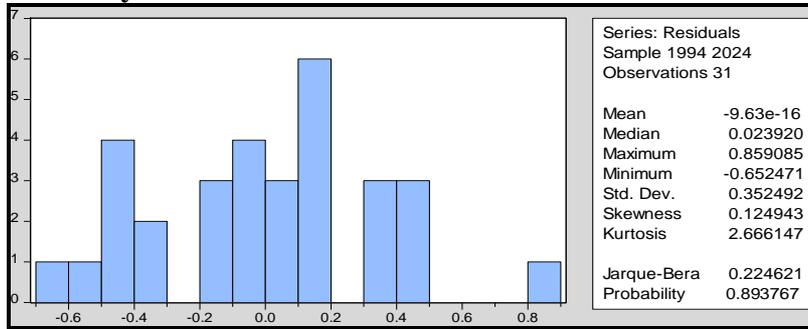
Omitted Variables: Powers of fitted values from 2 to 5

	Value	df	Probability
F-statistic	4.19834	(4, 1)	0.1110

F-test summary:

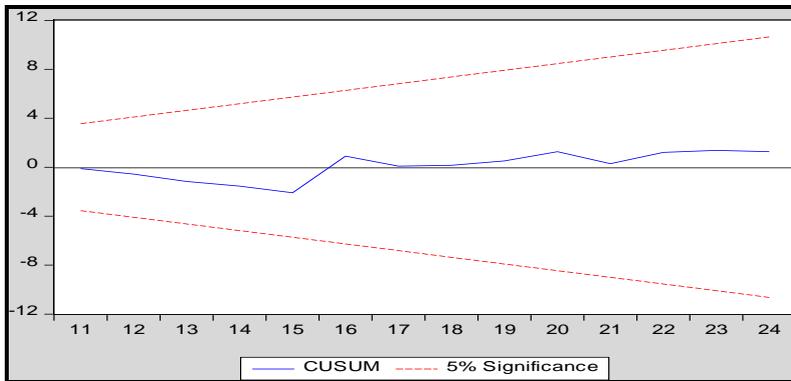
	Sum of Sq.	df	Mean Squares
Test SSR	3.707004	4	0.926751
Restricted SSR	3.727508	5	0.745502
Unrestricted SSR	0.020504	1	0.020504

4) Normality Test:



5) Stability Test:

A. CUSUM Test:



B. CUSUM of Squares Test:

