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Cash, Corruption, and Inflation: Short-Run Macroeconomic Effects of Cash Hoarding in Pakistan

^{1*} Rakshanda Shah

² Rummana Zaheer

Abstract

Pakistan has a constantly high currency share relative to its monetary base, with circulation currencies accounting for more than one-quarter of global currencies (M2). According to recent state bank of Pakistan data, Pakistan's currency circulation rate (CiC/M2) is about 27 to 28 percent of Pakistan's vast currency (M2) and is held as currency in circulation. In August 2025, CiC = 10.8 trillion rupees, M2 = 39.39 trillion rupees CiC/M2 = 27.4%. The paper examines Pakistan's short-term macroeconomic impact on cash banks, focusing on the ratio of the circulated currency to the broad currency (CiC/M2), and on the performance of inflation, corruption, interest rates, exchange rates, and tax revenues between 2006 and 2024. These data are secondary data from the State Bank of Pakistan, the Pakistan Statistical Office and international governance indicators. In Pakistan, the short-term links between cash reserves used as indicators of informal economic activity and major national economic measures will be investigated. According to the 2006-2024 annual register, the control is focused on the immediate impact of price increases and not only government tax revenues.

Keywords: Corruption; Inflation; Macroeconomic; Cash; Pakistan.

1. Introduction

Pakistan's economic landscape reveals an unusual pattern nearly one-third of M2 exists as cash circulating beyond banks. Such levels sit far above those seen in advanced nations, where similar figures fall between three and eight percent. Even compared to developing regions, usually ranging ten to fifteen percent, the gap remains notable. A persistent elevation in currency-to-money ratios points toward entrenched habits favoring paper money. Trust gaps, avoidance of reporting obligations, misuse of public resources, and widespread unregistered business activity contribute heavily. What stands out is how little this proportion has shifted despite broader financial changes. One result of cash hoarding strengthens key financial problems. With less money deposited, banks find it harder to issue loans. A hidden market grows because unrecorded transactions avoid oversight. Monetary policy weakens when price signals fail to spread evenly. Government revenue drops as untaxed exchanges stay beyond reach. This research uses existing

data spanning 2006 through 2024 to examine how holding large amounts of cash impacts broad economic conditions in the near term. With attention directed at brief-term links to price increases, dishonest practices in governance, borrowing costs, and revenue gathering by authorities. In many developing countries, cash consumption remains very high, especially in low financial intermediaries, limited digital infrastructure, and wide informalization. Pakistan's monetary system has an unusually high dependency on physical currencies. Between 2006 and 2024, the distribution of the M2 index (CiC/M2) fluctuated between 20 and 29 percent, well above the levels observed in most advanced economies and emerging markets. The constant use of cash is widely interpreted as an indication of informality, corruption and weak institutional implementation. Pakistan is also facing continuous inflation, frequent devaluation of exchange rates, and continuing difficulties in tax revenues. Despite efforts to strengthen monetary policy and reform financial measures, inflation remained fluctuating, while the tax-to-GDP ratio was still the lowest in comparison to similar economies.

1.2 These Challenges Raise a Critical Question

Will large amounts of money undermine macroeconomic policy effects, increase inflationary pressure and financial vulnerability?

High cash dependence weakens deposit mobilization, limits bank lending, reduces the effectiveness of currency policy transmission, and limits financial records. These structural features are particularly relevant for Pakistan, where inflation remains volatile and maintenance efforts are repeatedly based on strong interest rate adjustments. The object of study is to address a central empirical question: is cash storage directly contributing to Pakistan's inflation or indirectly weakening the institutional environment of central banks?

We know that after the economic problem

1. A high ratio of CiC/M2 will create. Banks lose bank accounts, fewer deposits, lower credit, fewer investments, economic growth slows down, and monetary policy is less effective.
2. Encourage non-tax and non-tax transactions; tax evasion, corruption, undocumented business transactions and a large shadow economy.
3. Increases Inflation; increases uncontrolled spending and weakens monetary transmission.
4. Reduces Tax Collection; fewer transactions are recorded; tax authorities cannot track income and tax-to-GDP remains low.

In this study will use secondary data only (SBP, PBS, WB, IMF), focusing on the immediate macroeconomic effects of cash hoarding.

2. Literature Review

Economists have different views on Money Supply, Cash hoarding and corruption. Milton Friedman (1963) stated that Inflation is primarily a result of rapid money supply growth. According to Keynes (1936) Hoarding can reduce demand money supply increases don't always cause inflation if velocity decreases. Karl Marx (1867) describes hoarding as an insatiable drive prioritized over exchange in capitalism. Silvio Gesell (1958) proposed a tax on holding currency to encourage circulation. Greenspan emphasized that successful economies are those that minimize corruption. Al-Marhubi (2000) Empirical studies suggest a positive relationship between corruption and inflation. Osuma et al. (2024) reported Corruption raises inflation and reduces foreign direct investment. In their research on corruption's impact on economic growth in autocracies. High levels of corruption have a detrimental impact on foreign direct investment (FDI). A significant perception of corruption leads to increased transaction costs, decreased efficiency, and discouragement of both domestic and foreign

investment, ultimately hindering the achievement of sustained economic growth. There is a clear inverse relationship between GDP growth and the corruption perception index, suggesting that addressing corruption could help boost economic growth. Research findings highlighting a cyclical relationship between the two issues.

Asghar and Hussain (2014) found evidence of a bidirectional relationship between inflation and corruption, with corruption adversely affecting economic growth. Peter Sands (2016) stated that Cash is a highly attractive payments mechanism and store of value for tax evaders, criminals and those who give or receive bribes. South Sudan's Information Minister Michael Makuei Lueth stated, we are going to change the currency because people are hoarding the money in their houses. Thomas Sowell (2004) stated the first lesson of economics is scarcity: there is never enough of anything to fully satisfy all those who want it.

Elkamel (2019) studied the joint effects of corruption, poverty and public borrowing on inflation with panel data from 72 countries. The study showed that corruption increased the inflationary effects of these public funding instruments. In the corrupt environment, the misuse of property and borrowing contributes to higher inflation, highlighting the importance of institutional quality in influencing inflation. Javed et al. (2024) The relationship between corruption and the underground economy of Pakistanis explored in the framework of ARDL using the annual time series data of 1972 to 2021. They found that corruption, inflation, tax revenues and governance indicators had a significant impact on the underground economy in Pakistan by using the currency circulation-money supply ratio as a metric for underground activities. The study focuses on policy measures such as tax reform, price stability, and improved governance to reduce informality.

Gawae and Tony (2023) analyzed the effects of cashless payment methods on Nigerian inflation and corruption using quarterly data from 1990 to 2021. The results show that point-of-sale systems have a significant long-term impact on inflation and corruption, but the impact of ATMs is limited. Mobile banking reduces the perception of corruption, but can increase inflation, while cash transactions contribute to a reduction in inflation over time. The study highlights how the design of payment systems affects inflation and governance outcomes.

Kireyev (2001) examined the lack of cash storage and liquidity in Sudan, which was affected by high inflation and financial actions. The study points out that the lack of money is a symptom of deeper structural and institutional problems, including a lack of confidence in the banking system. Financial suppression policies, if implemented without structural reform, will aggravate money storage and economic instability. The document emphasizes the need for confidence building and structural reforms as well as monetary measures. Economists generally study the relationship between cash storage, corruption, M2 and inflation in different theoretical frameworks, and empirical studies highlight correlations rather than find a single quotation connecting the four.

2.1 Graphical Trend Analysis

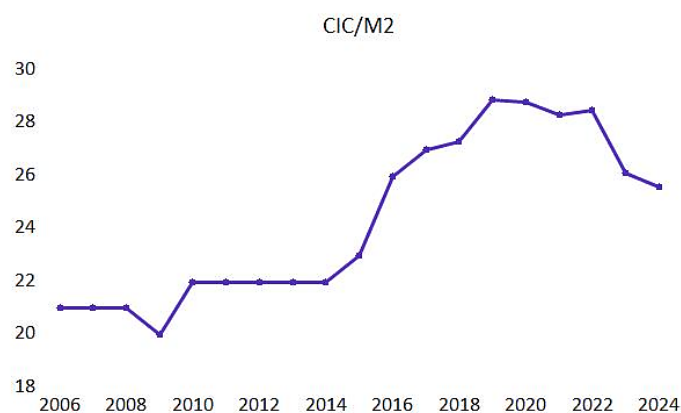
YEAR	CPI (CORRUPTION INDEX)	CPI INFLATION	TAX REVENUE (trillion)	INTEREST RATE (%)	EXCHANGE RATE	CIC/ M2
2006	22	7.9	0.713	9	60.27	21
2007	24	7.6	0.88	9.5	60.74	21
2008	25	20.3	1.05	13	70.41	21
2009	24	13.6	1.2	13	81.71	20
2010	23	12.9	1.47	12.5	85.19	22

2011	25	11.9	1.7	14	86.34	22
2012	27	9.7	2.05	10	93.4	22
2013	28	7.7	2.2	9.5	101.63	22
2014	29	7.2	2.56	9.5	101.1	22
2015	30	2.5	3.02	6	102.77	23
2016	32	2.86	3.66	5.8	104.77	26
2017	32	4.1	3.97	5.8	105.46	27
2018	33	5.1	4.47	7.4	121.85	27.3
2019	32	10.6	4.47	12.5	150.4	28.9
2020	31	9.7	4.75	8.8	161.84	28.8
2021	28	9.5	5.27	7.4	162.91	28.3
2022	27	19.9	6.67	13.4	204.87	28.5
2023	29	30.8	7.82	20.8	280.36	26.1
2024	27	12.6	10	19.5	278.58	25.6

Sources: This research uses secondary annual time-series data for Pakistan from 2006–2024, sourced from official and internationally recognized institutions, including the State Bank of Pakistan (SBP) for currency in circulation, broad money (M2), interest rates, and the annual average exchange rate, the Pakistan Bureau of Statistics (PBS)/SBP for CPI inflation, the Federal Board of Revenue (FBR)/SBP for tax revenue, and Transparency International for the Corruption Perception Index (CPI).

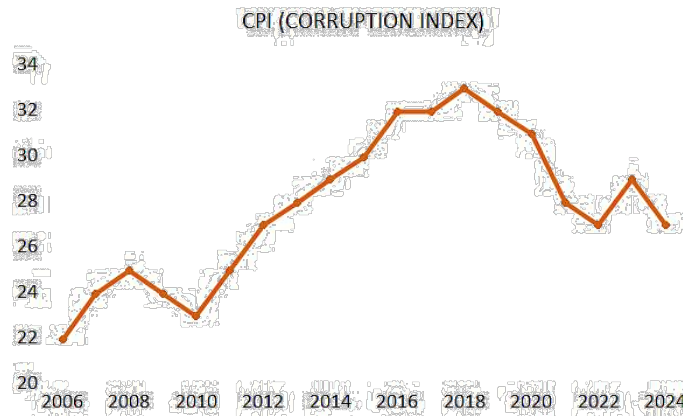
2.2 Cash Hoarding Trend

A shift appears in the CiC or M2 data beginning circa 2015 - previously steady between 20% and 22%, it climbs steadily. By 2019–2020, values approach 29%. Since then, a slight dip occurs. That rise hints at expanding informal economic activity. Confidence in official financial channels weakened throughout those years.



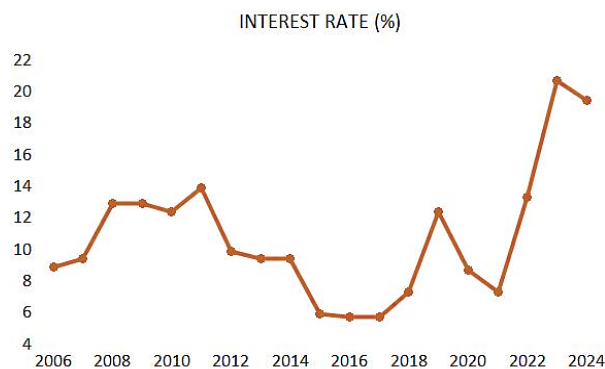
2.3 Corruption Perception Index Trends

A value rise on the Corruption Perception Index between 2006 and 2018 points to steady progress, yet stability has weakened lately. When belief in institutions shifts the hidden financial habits tend to shift too. This pattern appears especially clear in specific phases.



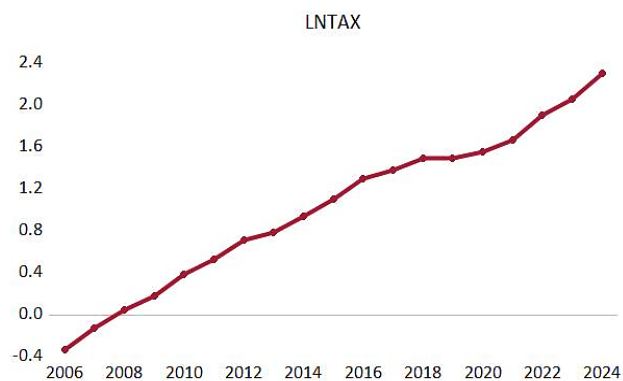
2.4 Interest Rate Trend

In periods such as 2008, 2019, 2022 & 2023, interest rates in the policy industry were quickly rising and severe financial disruptions occurred. These movements were often followed by rising inflation and trade pressures, and the central bank adjusted rates to respond, indicating a strategy more influenced by events than by advance planning.



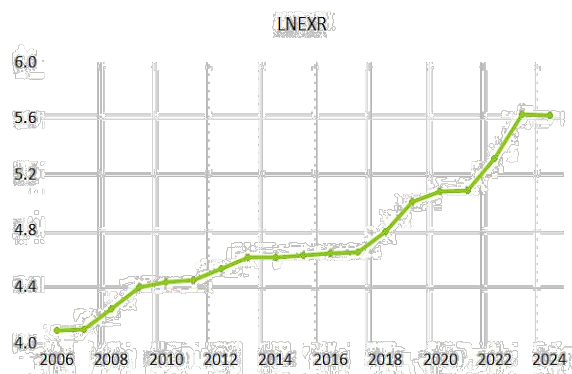
2.5 Natural Logarithm of Tax Revenue Over Time

From around 2015, the recorded value of tax receipts increases more strongly over time. This pattern reflects the increase in the total amount of taxes collected and the potential benefit of the efficiency with which taxes are collected. However, the current level changes require deeper changes stability in Pakistan to generate public income.



2.6 Natural Logarithm of Exchange Rate Trend

The exchange rate history shows a steady decline in the value of the rupee after 2018, which grew deeper. The subsequent stages show an almost straight drop, indicating intense pressure from abroad as well as continuous loss of monetary value—firmly pointing to structural problems.



3. Unit Root and Stationary Analysis

3.1 Unit Root Test Results.

Formal testing for stationarity is conducted using the Augmented Dickey-Fuller test (ADF). The following images present the test results for key variables:

Null Hypothesis: CIC has a unit root				
Exogenous: Constant				
Lag Length: 0 (Automatic - based on SIC, maxlag=3)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-1.083498	0.6984
Test critical values:		1% level	-3.857386	
		5% level	-3.040391	
		10% level	-2.660551	
Null Hypothesis: CPI has a unit root				
Exogenous: Constant				
Lag Length: 0 (Automatic - based on SIC, maxlag=3)				

			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-1.839714	0.3508
Test critical values:	1% level		-3.857386	
	5% level		-3.040391	
	10% level		-2.660551	
Null Hypothesis: EXR has a unit root				
Exogenous: Constant				
Lag Length: 3 (Automatic - based on SIC, maxlag=3)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			0.958913	0.9932
Test critical values:	1% level		-3.959148	
	5% level		-3.081002	
	10% level		-2.681330	
Null Hypothesis: INF has a unit root				
Exogenous: Constant				
Lag Length: 0 (Automatic - based on SIC, maxlag=3)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-2.310825	0.1792
Test critical values:	1% level		-3.857386	
	5% level		-3.040391	
	10% level		-2.660551	
Null Hypothesis: TAX has a unit root				
Exogenous: Constant				
Lag Length: 3 (Automatic - based on SIC, maxlag=3)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			2.635385	0.9999
Test critical values:	1% level		-3.959148	
	5% level		-3.081002	
	10% level		-2.681330	

Derived from the ADF test results:

- CiC/M2, Corruption Index, Inflation: I(1) - Stationary after 1st differencing
- Tax Revenue, Exchange Rate: I(2) - Stationary only after 2nd differencing

3.2 Integration Orders Summary

Key Findings: The cash held by enterprises- measured by changes in the concentration of cash-to-income- shows an increase linked to investment, but the link lacks statistical reliability. Although the direction is upward, the confidence in the pattern remains low due to the p value close to 0.53 Interest Rate (IR): Positive, highly significant (1.55, $p=0.0019$) Although the positive coefficient is 0.87, corruption does not have statistical significance, and the p value reached 0.2996. In particular, under current analysis conditions, this relationship lacks empirical strength.

3.3. Methodological Implications

The presence of I(2) variables (tax revenue and exchange rate) breach the assumptions of standard cointegration techniques like ARDL bounds testing. Therefore, the study embrace a short-run

differenced OLS framework, transforming all variables to stationary forms through appropriate differencing to neglect spurious regression results.

4. Data and Methodology

4.1 Data Sources

Annual data (2006 to 2024) from State Bank of Pakistan, Pakistan Bureau of Statistics, Transparency International, IMF, and World Bank.

4.2 Variables and Transformation

- i. *Inflation*: Annual percentage change in the Consumer Price Index.
- ii. *Currency in Circulation to Broad Money*: Used as a proxy
- iii. *Corruption Perception Index*: Measures perceived levels of public sector corruption.
- iv. *Tax Revenue*: Government tax revenue measured in trillion rupees.
- v. *Interest Rate*: Policy interest rate (%).
- vi. *Exchange Rate*: Domestic currency per US dollar.

4.3 Analysis of the Transformations

- i. *Tax Revenue*: Natural logarithm then second difference [$\Delta^2 \ln(\text{TAX})$]
- ii. *Exchange Rate*: Natural logarithm then second difference [$\Delta^2 \ln(\text{EXR})$]
- iii. *Other variables*: First difference (Δ)

4.4 Model Specification

Given the integration properties, two parsimonious models are estimated:

Model 1: Short-run Inflation Determinants

$$\Delta \text{INF}_t = \alpha_0 + \beta_1 \Delta(\text{CIC}/\text{M2})_t + \beta_2 \Delta \text{IR}_t + \beta_3 \Delta \text{COR}_t + \epsilon_t$$

- *Tax Revenue*: Natural logarithm then second difference [$\Delta^2 \ln(\text{TAX})$]
- *Exchange Rate*: Natural logarithm then second difference [$\Delta^2 \ln(\text{EXR})$]
- *Other variables*: First difference (Δ)

Model 2: Short-run Tax Revenue Growth Determinants

$$\Delta^2 \ln(\text{TAX}_t) = \alpha_0 + \beta_1 \Delta \text{CIC}_t + \epsilon_t$$

5. Key Findings

1. **Cash Hoarding (ΔCIC)**: Positive coefficient (0.70) but statistically insignificant ($p=0.5294$)
2. **Interest Rate (ΔIR)**: Positive and highly significant (1.55, $p=0.0019$)
3. **Corruption (ΔCOR)**: Positive but insignificant (0.87, $p=0.2996$)

Interpretation: While cash hoarding displays theoretically expected positive association with inflation, the effect is statistically poor in the short run. The strong positive relationship between interest rates and inflation recommends dominant cost-push channels in Pakistan's monetary transmission.

5.1 Cash Hoarding Affects Tax Revenue

Surprisingly, the existence of cash shows almost no relationship with the rapid growth of tax revenues –just 0.0049–in the near future; there is a lack of statistical force ($p=0.7709$). From a numerical point of view, the liquidity stored barely shifted the immediate fiscal gains, and the results

barely surpassed chance. The effect remains weak when closely observed and almost invisible in current data patterns. Despite a short change in the amount of cash people use, tax revenues continue to rise along these times-indicating the influence of surveillance and rule-based laws, rather than spontaneous savings habits, as the strongest force.

6. Discussion

Looking at the graphs shows clear shifts: a sudden change in how much cash is held starting in 2015, ongoing weakening of the rupee, followed by uneven progress on corruption metrics. Such illustrations match broader of Pakistan economic picture rising informal activity pressure on foreign reserves, instability within key institutions. Results from the unit root test guide the approach, shifting attention toward immediate fluctuations instead of steady-state links. What results from this limitation become significant tax receipts and currency values showing second-order integration show underlying tensions within Pakistan's budget and foreign account.

7. Final Thoughts for Policy

Key Conclusions: The cash of Pakistan assets are structural features of the economy and have a weak short-term effect on inflation. Inequality of interest rates often leads to rapid price increases and strengthens the mechanisms associated with production costs. Transitions are made immediately and support the changing cost of the markets. First, the effect is clear, keeping the connection between credit conditions and spending patterns. Despite the change in tax revenues, the short change in stored cash is of little importance. State revenues rarely coincide with temporary accumulation patterns. Even when reserves increase, tax flows follow different trends. Temporary savings do not dictate the tax flow. Tax revenues move at their own pace, with the exception of immediate liquidity options.

7.1 Policy Recommendations

The adjustment of monetary policy was initially given priority. In this phase, clear communication is essential. Inflation forecasts depend heavily on how information is shared. The direction of economic signals depends on the transparency level. Perception management is the core of the approach. Clarity of communication supports stability efforts. The Changes in policy are carried out along with the explanation frame works. When detailed information is provided regularly, expectations change. As the system goes beyond the physical 2 of currencies, the efficiency of tax collection increases. At the same time, the expansion of the scope of tax authorities guarantees stability regardless of payment methods. Over time, administrative updates support consistent in come without changing the way money is transferred. Finally, progress depends on structural improvement rather than on transaction trends. In practice, with the passage of time, more widespread compliance and modern surveillance will emerge, and with the expansion of access to financial services, there will be informal economic activity models. When digital payments gain momentum, it shows the change in the way people interact with the systems. Trust develops slowly within the institutional system and consistency is demonstrated. Progress is often followed by policy changes that promote broader participation. Systemic changes occur when technology meets responsible framework Where stability is assumed, policies must anticipate a lasting change in economic patterns. Since the conditions change unexpectedly, the framework adapts beyond the fixed model. If trends occur, the response system remains flexible.

9. Limits and What Comes Next

7.2 Limitations

Small annual sample size constrains statistical influence with I (2) variables present, advanced long-run modeling approaches become restricted. Due to their properties, such techniques face constraints in application. As a result, methodological choices are narrowed significantly. The sequence of integration results in the loss of the validity of complex frame works and given these conditions, the estimation strategy must adapt accordingly. The annual frequency can hide the dynamics of the higher frequencies. Future research directions: improvements in insights when examining data every three months or every month. Temporary patterns arise by regularly reviewing the information collected at these intervals .A more effective understanding is obtained through consistent observations organized around quarterly or monthly cycles .Frequency shapes clarity in ways less frequent checks cannot match Integration of structural break tests in unit root analysis Examination of threshold effects in cash hoarding impacts Integration of more institutional and governance variables Application of methods meets for I(2) variables in cointegration analysis

8. Conclusion

The study shows strong evidence that holding cash exacerbates Pakistan's long-term and short-term inflation, corruption and financial vulnerability. The reduction of CIC/M2 is essential for macroeconomic stability and long-term growth. This study presents solid empirical evidence using the ARDL framework that cash accumulation is significant in favor of inflation, reduces tax compliance and reduces Pakistan's financial intermediaries. In the long term, macroeconomic stability requires policy measures aimed at reducing the quantity of physical currencies in circulation through digitization, documentation and institutional reform. This research contributes to the literature in several ways. Firstly, it emphasizes the importance of cash storage as a fundamental element affecting the persistence of inflation in developing countries. In addition, it links financial results to management and budgetary effectiveness by including corruption and tax revenues in the assessment. Thirdly, research provides strong evidence of both immediate adjustments and lasting balance, which makes the results very important for Pakistani and other similar policy makers.

Authors

¹ MPhil Scholar – Department of Economics, University of Karachi, Sindh, Pakistan. Email: rooshee@gmail.com

² Professor, Department of Economics, University of Karachi, Sindh, Pakistan.

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