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CHEQUE CLEARANCE AND LIQUIDITY TRANSMISSION IN LOW-INCOME ECONOMIES

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Abstract

This paper investigates the efficacy of cheque usage as a liquidity-transfer mechanism in low-income economies. First, the paper analyses clearance regime architecture efficiency. Second, the paper examines the clearance cycle for a house cheque, inter-city cheque and up-country cheque, which generates descriptive statistics upon which findings are drawn. The paper detects positive correlation between income per capita and clearance regime sophistication and efficiency, with high-and-middle-income economies operating more secure, faster regimes which ensure efficient liquidity transmission. The paper also notes clearance cycle delays, creating float, with its economy-wide money supply measurement distortionary and spill-over effects. Float traps liquidity and acts as a temporary capital rationing mechanism which generates short-term interest rates and cost of capital shocks. To our knowledge this is the first study of its nature on the topic, with such a sample and methodological approach. This paper seeks to inform the policy debate, especially low-income economies of the need for a modern, integrated payment and clearance infrastructure that promotes efficient capital mobility, financial sector stability and economic development.

Key Terms: Cheque clearance, payment system architecture, clearance cycle, float, liquidity transmission

I. INTRODUCTION

Cheque clearance systems aid interbank markets in liquidity transmission, with efficient systems critical for monetary policy implementation, [40]. Archaic and poorly configured systems propagate, disseminate and amplify shocks and panics via the significant monetary aggregate traffic channelled though them. Clearance regime efficiency varies by jurisdiction, depending on systemic platforms amongst other factors. Conscious that systemic design may hinder efficiency, clearance regimes facilitate liquidity transmission efficacy through sophisticated and resilient infrastructure, for shorter cycles spanning hours, [28,17]. Other regimes rely on antiquated long-cycle systems, spanning weeks, generating float, a market failure that results in inflated monetary aggregate, interest rate shocks and sub-optimal capital mobility and allocation.

Float results in liquidity risk, involving costly macro-prudential mechanisms to mitigate, [6]. The payer earns interest income on the float, resulting in excessive consumption of goods before his account is debited. In some regimes, to accelerate the process, the collecting bank engages in costly short-term inter-bank borrowing, resulting in an increase in the demand for short-term funds and consequently, short-term interest rates. Thus, at micro-level, while float has a negative impact on liquidity transmission, at macro-level, its spill-over effects trigger temporary macro-prudential policy shocks, [31]. At its peak, average daily float fluctuated between $2.7 billion (1975) and $6.5 billion (1979), before tapering off to $774 million, [27], a decline credited to Federal Reserve penalties for banks float and the adoption of real –time hi-tech clearance platforms facilitating faster tech-driven payment methods.

Prior research [7, 23, 36] explores clearance regimes from a high-income economy perspective. Thus far, there is a gap on the macro-economic effects of clearance regime architecture and liquidity transmission from a low-income economy perspective. This paper perceives this gap as significant and meriting investigation. To our knowledge, no comprehensive study has explored float impact from a low-income economy prism. The paper explores this gap using a sample of low-income clearance regimes.

The paper's major aim is to enhance our understanding of clearance infrastructure, cycle regimes and the float influence of on economic agents. First, the paper examines clearance systemic design and resilience. Second, the paper analyses cycle regimes and float impact on liquidity transmission and capital allocation. The paper reports a notable link between Gross Domestic Product (GDP) and clearance infrastructure systemic efficiency. The paper further notes temporary but critical float-induced systemic shocks. The paper concludes that it is extraordinary that most countries operate slow-cycle regimes when requisite technology is available and economic advantages of faster-cycle regimes are obvious and immense.

II. LITERATURE REVIEW: CLEARANCE LIREGIMES AND FLOAT GENERATION

Wherever Times is specified, Times Roman or Times New Roman may be used. If neither is Cheque use is a puzzling phenomenon, with its clearance epitomized by cycle delays and float. While it is the most labour intensive and costly payment media [15, 13, 34], it remains popular [16] for small-value payments in some regimes and all payments in others. There is varied literature on clearance systemic design and regimes globally [38]. The first, [14, 37, 39] notes that while clearance regimes are critical to the economy through the ability to transmit systemic shocks, their efficiency is a collaborative effort between banks and macro-prudential authorities.

The second, (1, 34, 35] notes a drastic reduction in cheque use, to levels where, it persists for sentimental reasons. The [2] argues that for most high-income economies, payment systems deter cheque use by either making it costly or alternatives and cheaper. For example, in 2011 the UK Payments Council withdrew the cheque guarantee card scheme, with UK retailers rejecting the cheques as payment media as a consequence. Elsewhere, retail has stopped accepting cheques because of the slow-clearance cycle, [9].

The third, focusing on low-income economies, [18, 32, 34,) rationalises that cheques usage continues for large-value transactions that are risky or impossible to execute in cash. [19, 20] argue that cheque popularity is restricted by fraud and slow cycles, with cheques used as a last-resort for government-related services and the adoption of hi-tech driven media fuelling a decline in cheque use and, by implication, float.

The fourth, examines global payments system architecture and clearance regimes and their consequences, [2, 3, 30, 29]. The [11] suggests that clearance regimes must embrace truncation and modern architecture to reduce the clearance cycle and eliminate float. However, while fast-cycle regimes accelerate liquidity transmission, tech-related costs remain a barrier for low-income economies, [39, 9]. Further, fast-cycle regimes inadvertently promote fraud due to limited cheque authentication time and the cycle maybe severely disrupted due to extraneous reasons, [30]. For example, an innocuous event like go-slow by an unrelated but supportive sector like logistics, severe weather conditions or electricity outage, can disrupt cheque delivery and clearance. While such interruption creates inconsequential inconveniences for well-resourced firms, for the capital-constrained, consequences may be ruinous if convention is slow-cycle regime in a hyper-inflationary economy.

In most regimes, macro-prudential authorities give banks the liberty either or not to pay interest on cheques subject of clearance. Two very critical policy issues emerge with such an approach. First, in equilibrium for the first regime, the payer's bank instantly debits the payer's account for clearinghouse settlement. The clearinghouse in turn, credits the payee bank's reserve account on the proviso that the payee's bank instantaneously credits the payee's account to enable credit interest calculation but on the proviso that the funds are not withdrawn pending clearance confirmation. For example, following a 2-5-8 clearance regime, the payee starts to earn interest on the outstanding cheque proceeds 2-days after the deposit (T+2). The payee can withdraw the yet-to-be confirm-cleared proceeds from day-5 after the deposit, while conscious that the cheque can still be dishonoured if it does not meet essential requirements. Finally, the cheque proceeds are confirm-cleared and legally belong to the payee on day-8 after the deposit.

It is impractical for the clearing regime to keep track of all cheques and instantly credit the payee bank's reserve account on clearance-confirmation, which produces the second equilibrium. Under this equilibrium, following a rota determined by the payer bank's clearing zone location, to simplify matters the clearinghouse instantly credits the payee bank's reserve account before the payer has been debited. The clearinghouse does so fully aware that the payee's bank will not concurrently credit the payee. Such equilibrium creates two equal credit amounts in the clearance system: funds still earning interest income in the payer's account and funds credited by the clearing house into the payee bank's reserve account. The duplication inflates monetary aggregate to generate float, which subsists till clearance, causing short-term interest rate shocks, the consequence of whose aftershocks macro-prudential authorities must tackle.

To eliminate float, most high-income economies have adopted truncation and parallel clearance systems, encompassing both central bank-owned and private zonal clearinghouses, [2, 3] and a shift from deferred net settlement (DNS) system to real time gross settlement systems (RTGS) for large-value payments. Low-income economies which rely on slow-cycle regimes and clearance via central bank liquidity, [38, 39] would suit a basic zonal clearing model. However, zonal clearance regimes prove too sophisticated and onerous for low-income economies, with cheques physically exchanged between banks and positions netted zonally.

[4] note a positive correlation between population size, standard of living, level of human capital and real GDP and cross-country RTGS and hi-tech driven payment media adoption, which eliminate counterparty credit risk and float, with clearance effected instantly, on an individual gross basis, irrevocably and with finality in real time (World Bank 2010), compared with the DNS end-of-day bulk-netted transactions. Thus, an efficient and resilient system such as the RTGS facilitates smooth monetary policy implementation and stable financial markets. The World Bank (2008), notes that, globally, 83% of the regimes have adopted RTGS with the central bank acting as a settlement agent for 99% of the regimes.

While some regimes lack the capacity and willingness to modernise clearance architecture, this is felt mostly in low-income economies, two thirds of which utilise the same system to clear both large and small-value payments, [39]. Conversely, when low-income economies have the capability and motivation to innovate, supportive infrastructure, like the telecommunications, internet and data transmission is antiquated, [9] and impossible to integrate with clearance architecture. At times, such infrastructure cannot withstand even minor shocks like weather changes. While weather affects both high-income and low-income economies equally, the former usually have integrated, resilient and more sophisticated response systems to cope with any calamities.

III. CHEQUE KITING, LIQUIDITY TRANSMISSION AND ECONOMIC ACTIVITY

The evolution of the global payment system has resulted in cheque use supplanting cash as payment media. The cheque is simple to process if it involves one party: the payee, who concurrently becomes the payer or multiple parties, provided that it is presented for encashment. Even if the cheque involves several parties, process clarity is in no doubt and clearance is instant. However, matters get complex, if, as in most regimes, the payee must present the cheque specifically to the payer's branch for clearance, which may compel the payee to travel long distances.

Issues get more convoluted if different banks are involved and the cheque must be deposited. The payee deposits the cheque in his branch (collecting bank branch), which remits it for clearance to the clearinghouse, usually the central bank. The clearinghouse transmits the cheque to the payer's bank clearing branch for clearance confirmation. [24] observe that credit to the payee's is not effected until the payer has been debited, the cheque confirmed-cleared and funds credited to the payee bank's reserve account. However, most regimes effect instant but

temporary credit into the payee bank's reserve account, [3, 10]. The payee's bank can invest the float in money markets, as compensation for the onerous and costly task of clearance, [24].

Based on float predictions, the clearinghouse decides daily whether to execute open market operations and raise an amount equivalent to the float to plug the gap. Thus the liquidity transmission mechanism is extremely unpredictable and countercyclical for dichotomous reasons in different regimes, dependant on the season, zoning, bank concentration, day of the month, etc, with each factor exerting unique float shock effects. This, together with financial architecture design inadequacies affects liquidity transmission and capital mobility if cycle lags produce brief "float" shocks large enough to trigger macro-prudential intervention. Thus the ability to mitigate float impact via macro-prudential operations is as effective as float forecasting efficiency.

The payer can also exploit cycle delays via kiting, issuing cheques on accounts with insufficient funds. Kiting can be ruinous to the economy if it pervades the entire financial system, more-so with slow-cycle zonal regimes with remote zones and poor infrastructure, [22, 26]. The effect may be amplified should the amounts involved be substantial and time frames extensive. It is logical for payers to exploit float by drawing cheques on far-flung branches to slow-cycles. While this has been reduced, there are still notable bubbles of cycle elongation.

Similar to kiting, payee banks invest reserve account proceeds in short term deposits. For out-of-zone cheques, this takes time to unwind. The difference between bank activity and kiting is the criminal element of the latter. The kiter acts fully aware that he has insufficient funds, while the bank exploits the cycle delay on the belief that rational economic agents issue cheques with adequate funds to back them. The payer over-engages in cheques, aware of the one-sided benefits accruing to him. Negative externalities in volatile and cyclical systemic shocks are entrenched. The payer benefits while market intervention spill-over effects in interest rate increases pervade the entire system. Under such circumstances, the payer has no incentive to curtail his activities, resorting to more cheques than would be the case if the true cost was passed fairly across the system. Thus, it is beyond contention that the payee is the only loser economically and that market failure creates inadvertent social costs and negative externalities.

At micro-level, float represses the clearance regime, specially the capital-constrained economic agents with crippling liquidity constraints, [33, 12, 5, 25]. Float temporarily traps liquidity and compromises capital earning power. For marginal economic agents, with a restricted and intensely competitive investment space for profitable projects, this can be debilitating. In some instances, the payee's bank may alleviate float adverse effects by granting the payee a temporary overdraft proportionate to the cheque proceeds or some peculiar but related amount. Whilst this partly mitigates the payee's plight from adverse float effects, it is naïve to believe that the overdraft facility is on a charitable basis. Economic rationale indicates the latter, which aggravates the payee's predicament via higher overdraft interest costs than interest income on the payee's deposit, [21].

IV. THEORETICAL FRAMEWORK

[16, 32, 34, 35] indicate that while cheque use has declined some regimes are still cash-dominated, a view reinforced by the [1, 3, 10, 39]. For example some low income economies have developing interbank and fast-growing payment regimes dominated by cash, with cheque use declining. Cheque use is declining in some regimes while it is very low in some, but for different reasons. While cash ensures maximum liquidity for economic agents and optimum liquidity transmission for the economy, it is a very inefficient and risky way of managing and transmitting liquidity.

Since different payment systems are imbedded with different clearance infrastructure, macro-prudential policies and dominated by different payment media (cash, cards or cheques, etc.,), there is an expectation of divergence in liquidity transmission in each economy. There is also likely a negative impact on the liquidity levels for firms from cycle delays. At macro-level, this may have an impact on the functioning of the financial markets and the economy.

V. DATA AND METHODOLOGY

The main aim of this paper is investigating clearance and settlement architecture efficacy for a sample of low-income economies for the period 2008-2012, from two sub-samples. The first sub-sample comprises the World Bank data on payments and clearance systems, which, in line with the World Bank per capita income classification, sorts regimes as high-income, upper-middle income, lower-middle income and low-income. The second sub-sample comprises of cheque clearance regimes from 30 low-income economies. Filtering the second sub-sample for compliance, after deletions for missing or inconsistent variables generates two further sub-samples: one disclosing clearance cycles, for house, inter-city and up-country cheques a sample of 13 low-income economies which conform to data disclosure requirements and another which only discloses house cheque cycles along a commentary on clearance mechanics and number of clearance episodes per day.

An economy is included in the sample if it satisfies data disclosure requirements to facilitate hypotheses investigation. Sample construction is by far robust, comprehensive and unique for a study of this nature. The sample overcomes prior study bias of focusing on high-income economies and boasts of all low-income economies fulfilling data requirements. The sample enriches analysis by facilitating hypothesis testing and a comparative analysis of clearance cycles across low-income economies. No known prior study exploring similar hypothesis has meticulously filtered data in such a manner to create such a robust analytical sample.

VI. STATEMENT OF HYPOTHESIS

This paper investigates the above phenomenon using the hypothesis framed below.

Hypothesis 1:

Low-income economies rely on poor payment infrastructure for payments across the sample period.

Low-income economies are lagging behind in the adoption of modern, sophisticated and fast-cycle payment, clearance and settlement architecture forcing them to rely on slow-cycle, labour intensive and costly payment media for both low value and high-value transactions.

Hypothesis 2:
There is a cycle delay (more than T+0) in cheque clearance regimes of the sample of low-income economies across the sample period for in-house cheques.
Confirmed-clearance, from the payer to the payee, is delayed to the next business day to debit the payer's account and credit the payee's account for the in-house cheque. This has serious implication on liquidity transmission and capital mobility, especially for the capital-constrained marginal economic agents.

Hypothesis 3:
There is a cycle delay (more than T+3) in cheque clearance regimes of the sample of low-income economies across the sample period for inter-city cheques.
Confirmed-clearance, from the payer to the payee, is delayed by more than 3-working days to debit the payer's account and credit the payee's account for the inter-city cheques.

Hypothesis 4:
There is a cycle delay (more than T+5) in cheque clearance regimes of the sample of low-income countries across the sample period for up-country cheques.
Confirmed-clearance, from the payer to the payee, is delayed by more than 5-working days to debit the payer's account and credit the payee's account for the up-country cheque.

VII. RESULTS AND ANALYSIS: PAYMENT INFRASTRUCTURE

The first analytical sample tests hypothesis 1, where low-income regimes are posited to have poor or fragile clearance and settlement infrastructure. **Table 1.1** below presents the global automated clearinghouse infrastructure by per capita income. High-income and upper-middle income economies' clearinghouse regimes possess high capacity, automated and efficient infrastructure compared with low-income economies, whose adoption levels are almost half of those of high-income economies.

Table 1.1 **Global Clearinghouse Architecture by Per Capita Income**

Automated Clearing house Regimes Architecture Per Capita Income (Percentage Number of Regimes Per Capita Income)	
Economic Regime (Per Capita Income)	
High Income Economies	74
Upper Middle Income Economies	77

Lower Middle Income Economies	59
Low Income Economies	44

This become clearer when read with **Table 1.2 Panel A** below, which presents analysis of large-value funds transfer systems, which process and settle large-value and time-critical payments. Results do not add to 100% since a number of regimes proffer more than one system through which large-value payments are processed. **Panel A** indicates that globally, the majority of payment systems have adopted the high-capacity, automated and fast-cycle RTGS system for large-value payments. However, this adoption appears to be somewhat positively correlated with per capita income.

The proportion of regimes operating an RTGS system to clear large-value payments is higher in the high-and-upper-middle income economies and low amongst low-income economies. Since some regimes employ more than one system, low-income economies are almost evenly split between the RTGS and the slow-cycle cheque clearinghouse, but dominate the "other" system category. Thus, most low-income regimes still operate counterparty-risk vulnerable, bulk-transaction end-of-day clearance DNS system compared with the resilient RTGS system embedded with mechanisms to mitigate systemic risk through continuous individual clearance.

Table 1.2 **Payments and Cheque Clearing System Features**

Panel A: Large-Value Transfer Systems (Percentage Number by Per Capita Income)			
	Real Time Gross Settlement	**Clearing House**	**Other System**
	(%)	(%)	(%)
Global Aggregate	**81**	**29**	**15**
Economic Regime (Per Capita Income)			
High Income	93	11	15
Upper Middle Income	93	33	12
Lower Middle Income	74	36	14
Low Income	59	42	22

Panel B: Clearinghouse Architecture / Features			
	Central Bank Owned / Operated Clearing House	**Automated Cheque Processing + Physical Cheque Exchange**	**Automated Cheque Processing + Cheque Truncation**
Global Aggregate	**56**	**55**	**33**
High Income	43	47	52
Upper Middle Income	46	60	28
Lower Middle Income	61	66	19

Low Income	85	51	24

Panel B presents the global cheque clearing systems architecture and indicates that the majority of low-income economies are still overly reliant on the central bank owned and operated infrastructure for clearance. While clearance regimes operate hybrid systems: either automated cheque processing plus actual cheque exchange system or automated cheque clearing plus truncation system to alleviate clearing system constraints, low-income economies dominate the slow-cycle former, which clear gross but deferred settlement or net-basis at the end of the session using central bank cash, while high-income economies dominate the fast and efficient latter. Thus, more than half of high-income economies rely on modern high-tech efficient automated clearing and fast cheque truncation, which drastically reduces clearance cycles.

Table 1.3 below presents the global credit transfer / direct debit clearance architecture. This result reinforces earlier analysis. **Panel A** indicates that the majority of low-income economies rely on automated clearinghouses or infrastructure owned and operated by the central bank, with most of such economies relying on architecture whose final clearance is executed via central bank liquidity. **Panel B** analyses global cheque clearance architecture and indicates that low-income economies rely on conventional slow-cycle systems, which execute clearance via central bank liquidity, and a high number of its regimes crediting payees after the mandated global 2-day threshold. Most of the high-income economies clear via the RTGS and clear within the mandated global 2-day threshold.

Table 1.3 **Automated Transfers and Cheque Clearance Architecture Features**

Panel A: Credit Transfers Direct Debits and Automated Clearing Architecture (Percentage Number of Transactions)			
	Automated Clearing System / Owned / Operated By Central Bank	**Netting Executed At Least Once Daily**	**Final Clearance Executed Through Central Bank**
	(%)	(%)	(%)
Global Aggregate	**40**	**91**	**17**
Economic Regime (Per Capita Income)			
High Income	29	90	13
Upper Middle Income	37	90	14
Lower Middle Income	35	93	19
Low Income	91	91	32

Panel B: Clearing House Architecture (Percentage Number by Per Capita Income			
	Settlement Via Real Time Gross Settlement	**Settlement Via Central Bank Liquidity /**	**Payee Credited <T+2**

	System	System	
Global Aggregate	**73**	**24**	**75**
Economic Regime (Per Capita Income)			
High Income	82	12	80
Upper Middle Income	83	12	77
Lower Middle Income	65	33	73
Low Income	50	46	63

An analysis of the importance of cashless payment media by the percentage number of transactions per capita generates **Table 1.4 Panel A** and **Panel B** below. **Panel A** indicates that while there is still consolidation in other payment media, with no clear trends observable from the data, there is excessive reliance on cheques by low-income economies than high income economies. Actually, there is a notable inverse correlation between per capita income and cheque usage. Further, an examination of the architecture central bank clearinghouses rely on for clearance and settlement indicates that there are 108 clearinghouses in 114 countries and 25 countries without a clearinghouse, where cheques are either not used at all or not heavily used (Switzerland, Luxembourg, Netherlands, Eastern Bloc of the former Soviet Union, some Baltic States, Libya, Finland and Commonwealth of Independent States). **Table 1.4 Panel B** below indicates that globally, more than half of the clearance regimes rely on the central bank as a clearinghouse, with the low-income and lower-middle income economies dominating clearance operations executed via the central bank while high-income and upper-middle income regimes rely more on hi-tech driven automated clearance plus truncation systems.

Table 1.4 Clearance Regimes and Non-Cash Payment Media

Panel A: Cash-Less Payment (Percentage Number of Transactions)						
	Direct Credits / Credit Transfers	**Direct Debits**	**Debit Cards**	**Credit Cards**	**Cheques**	**Mobile-Based Technology Payments**
	(%)	(%)				(%)
Global Aggregate	**28**	**4**	**39**	**8**	**18**	**4**
Economic Regime (Per Capita Income)						
High Income	26	5	28	10	8	3
Upper Middle Income	36	5	33	9	14	8
Lower Middle	27	6	32	13	35	-

Income						
Low Income	28	-	27	-	40	7

Panel B: Clearing and Settlement Mechanisms (Percentage Number by Per Capita Income

	Central Bank Clearinghouse	**Automated Clearing + Physical Exchange**	**Automated Clearing + Truncation**	**Central Bank Liquidity to Clearance System**	**Payee Credited <T+2**
Global Aggregate	**56**	**53**	**35**	**41**	**73**
High Income	42	46	52	25	80
Upper Middle Income	44	54	33	53	71
Lower Middle Income	66	66	20	40	75
Low Income	83	49	29	49	57

Automation either with truncation indicates sophistication, speed and efficacy in clearance leading to the payee being credit within the 2-day threshold and an elimination of float. Maybe due to budgetary challenges, the low-income and low-middle regimes dominate in slow-cycle, less efficient clearing architecture with physical delivery processes, the central bank clearinghouse providing liquidity to the clearing system to manage float.

VIII. CLEARANCE CYCLE REGIMES AND CHEQUE FLOAT

The second analytical sample tests hypotheses 2, 3 and 4: focusing on cycle delay in house cheque, inter-city cheque and out-of-station cheque clearance. The hypotheses specifically investigate whether the house cheque clears after T+0, the inter-city cheque clears after 3-days (T+3) and the out-of-station cheque clears after 5-business days (T+5), which generates **Table 1.5** below. Apart from Bolivia, all clearance regimes have a T+1 cycle or greater, with Ethiopia and Malaysia, enjoying a confirm-cleared cycle of 3-days and 5-days after deposit. Bolivia enjoys the shortest clearance cycle for all cheque types and is the only one with a same-day house cheque clearance cycle.

Table 1.5 **Clearance Cycle by Cheque Type: Sample of Low Income Economies: 2008 – 2012**

Clearance Regime	**House Cheque Cycle**	**Inter-City Cheque Cycle**	**Out-of-Station Cheque**
Indonesia	T+1	-	T+27*
Ethiopia	T+3	T+5	T+21*
India	T+1	T+3	T+8
Kenya	T+1	T+2	T+14
Sri Lanka	T+1	T+7	T+7**

Tanzania	T+1	T+4	T+8
Ghana	T+1	T+9	T+9**
South Africa	T+1	T+7	T+7*
Seychelles	T+1	T+3	T+3**
Namibia	T+1	T+5	T+10
Malaysia	T+5	T+8	T+11
Hong Kong	T+1	T+5	T+5**
Bolivia	T	T+1	T+1***
Descriptive Statistics (Number of Days)			
Mode	1	3	8
Median	1	4.5	8
Mean	1.3	4.5	9.2
Standard Deviation	1.3	2.7	7.1

For the inter-city cheque, save for Bolivia, Seychelles, India and Kenya, all regimes confirm-clear inter-city cheques after 3-business days after deposit. Bolivia enjoys the fastest-cycle, 1-day after deposit (T+1). While Ghana has the slowest cycle at T+9, Indonesia does not have an inter-city cheque clearance system: a cheque is treated as either in-house or out-of-station. For out-of-station cheques, apart from Bolivia, Seychelles and Hong Kong, all regimes confirm-clear out-of-station cheques after 5-business days after deposit. Bolivia has the fastest clearance cycle at 1-day after deposit (T+1). On the other extreme, Indonesia has the slowest clearance cycle for out-of-station cheques after 27-business days after deposit (T+27), followed by Ethiopia at T+21 business days. It is interesting to note the large cycle difference within each cheque category and across all the cheques. Whilst Bolivia enjoys the shortest clearance cycle across the board, interestingly, it has the same cycle for inter-city and out-of-station cheques, same as Ghana, Seychelles and Hong Kong. Descriptive statistics indicate that the out-of station cheque has the slowest cycle of all cheques.

IX. DISCUSSION OF THE RESULTS

The evidence sheds some light on the status of the low-income economies' clearance regimes. Tests indicate that with their archaic architecture, some low-income regimes enjoy short clearance cycles for all the types of cheques. While for others there are no differences between inter-city and up-country clearance cycles, there are still clearance regimes with slow clearance cycles. The slow clearance cycles generate float and trap liquidity longer, with negative economic consequences of sluggish business activity and economic growth. To maximise the exploitation of the situation, payers resort to kiting cheques on country branches, which further slows down the cycle and exacerbates float.

Further, automation and modernisation of clearance architecture, truncation and hi-tech related payments media is frustratingly slow in low-income economies. Clearance regimes are as diverse as the macro-prudential jurisdictions and face innumerable socio-economic challenges. Low-income economies alleviate float problems via a plethora of approaches. While some

regimes (**Appendix 1: Panel A** and **Panel B**) operate mainly cash-based economies, others operate normal business time frames, others open till mid-night. To shorten the cycle, other countries, (**Appendix 1: Panel A** and **Panel B**) operate zonal clearance while others operate multi-sessions, while some do not have a clearance system, but pay cheques on presentation over the counter. Further, some regimes rely on a dual system depending on the cheque value or currency denomination.

While the majority of the economies have embarked on clearance system reforms, they are slow and their ability and willingness to do so is contentious. Most of the low-income economies have fragile legal and regulatory frameworks for clearance systems, rely on vulnerable and sub-optimal cash, cheque and remittance systems even for large-value payments. Most of the low-income economies lack integrated clearance regimes, supportive infrastructure like internet and telecommunications, supervisory agencies, if they do, such institutions lack adequate and robust oversight powers.

X. CONCLUSIONS AND SUMMARY

The results indicate that different economies have different clearance systems and are at varying stages of system reform. While most of high-income economies are adopting shorter clearance cycles, mainly via truncation and associated technologies, most of low-income economies are lumbered with archaic infrastructure, leading to slower cycles and float. At micro-level, economic agents are temporarily starved of scarce liquidity, while at macro-level such delays engender short-term interest rate shocks. This is an fascinating policy matter since the truncation efficiency gains, integrated clearance networks and shorter cycles are clear and immense. This calls for macro-policy level clearance infrastructure (technology, institutions, regulatory framework, instruments, procedures and standards) reform. While this obviously poses insurmountable challenges to low-income economies, with their meagre resources, macro-policy level reforms towards a conducive legal and regulatory framework, supervisory agencies and standardised clearance cycles must be adopted as starting points.

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Appendix 1: Panel A: Cheque Clearance Systems: Select of Low-Income Economies

Country	House Cheque	Inter-City Cheque Cycle	Up-Country Cycle	Explanatory Commentary
Vietnam	T+3	T+5	T+10	Cheques used by individuals for low-value transactions. Intra-city/intra-province cheques cleared by SBV provincial centres at T+3. Inter-province cheques cleared SBV's National Processing and Settlement Centre at T+7
Uganda	T+1	T + 3	T + 3	Localised clearance houses speed up the process
Myanmar Cambodia, Laos	No inter-bank clearance system: Chequing system developing (B2B Cheques): Cash-Based Economy			
Paraguay	T and T + x	No clearance system. Two tier system: Regular cheques (T= 0) and post-dated cheques (payable on post-date: T=x)		
Brazil	T, T+1[1]	Two daily clearance sessions: Cheques up to $299.99 deposited after cut-off settled first (T+1). 2nd clearance for amounts above $299.99 on same day (T).		
Chile	T, T-1, T+1	Four sessions: 5:30 pm local clearance at main clearinghouse at T. Foreign currencies and zonal clearance T+1. 2nd session to correct errors held at 9:30 am. 3rd session: 11:30 am for returned items. 4th session: 3.00 pm		
Colombia	T+1	Two clearance sessions. T session on cheque presentation and 2nd session at T+1, in which the balances are calculated, excluding the returned items		
Dominican Republic	T+1	Cycle begins at 9:00 a.m. of T + 1. 2nd session of returned items at 3:00 p.m. of T + 1, Final session at T + 4.		
Ecuador	T+1	Clearing in 17 zones, selected on the basis of geographical distribution of banking infrastructure. Clearance centralized in Quito. Final settlement at 1:30 p.m. of T + 1.		
El Salvador	T	Dollarized economy, all cheques are in U.S$. Clearance on a T+1 basis. 10% –15% of cheques cleared outside San Salvador zone. Final clearing at 5:00 p.m. for returned items		
Guatemala	T+2	Single clearinghouse in local currency and U.S$ operated by a private sector entity. Two daily clearance sessions: Funds available at T + 2.		
Honduras	T	Cheques exchanged in 4 cities: participants use imaging to validate and clear cheques. Clearinghouse operates from 9:00 a.m. to 5:00 p.m. for first session, 2nd session between 5:00 pm - 7:00 pm., final session at 7:00 pm for returned items		

Jamaica	T+1	First session at 7:30 am for small-value payments and U.S$-denominated cheques. 3:30 p.m., interbank clearing occurs. 2nd session: 3:30 p.m-4:20 pm for deposits to cover all payments. 3rd session: 4:20 p.m., settlement occurs on a deferred multilateral net basis on accounts held at the BOJ. Funds available at T+1.

Appendix 1: Panel B: Cheque Clearance Systems: Select of Low-Income Economies

Country	House Cheque	Explanatory Commentary
Netherlands Antilles	T+3	Clearinghouse operated partially automated. On day (T), banks send cheque files from 10:00 a.m-1:00 p.m. Payer and paying bank accounts first debited. Funds are available by T+3. Partial cheque-truncation through US National Clearinghouse Association. Non-truncated cheques transmitted through BvdNA. Branches located on islands other than Curaçao settle cheques independently, via facsimile instructions, through a different account at the BvdNA
Nicaragua	T+2, T+3-5	Clearinghouse operates for both local currency and U.S$–denominated cheques. Two clearing sessions. Debit / credit transactions final, regardless of whether there are sufficient funds in the accounts to which the cheques are related. Funds available by T + 2 in Managua and from T+3-T+5 for other regions.
Panama	T+1	Cheques are presented at the clearinghouse from 3:00 p.m-7:00 a.m. of T+1. Clearinghouse requires banks to submit cheques within T+2 after receiving them, but the common practice is T + 1. Returned items must be informed 1-day after being received. Common practice is to post the customer account in T + 2: No official regulations on float.
Paraguay		Cheque main payment media. Three clearinghouses operated by Central Bank local currency cheques. Clearinghouses in Ciudad del Este and Encarnación send multilateral balances to clearinghouse in capital city of Asunción, which consolidates its own results with those of the other clearinghouses and settles the outgoing balances at Central Bank
Peru	T	Cheques most widely used after cash. U.S$–denominated cheques account for 35% of the total value settled. Clearinghouse owned and operated by a private firm. For each currency, there are two sessions—for presented items and rejected items, respectively. Participants send files from 15:00-24:00 of day T. Settlement is made on a multilateral net basis on T + 1. Funds to cover debit positions stemming from clearance are blocked in the accounts of the participants at Central Bank. Funds are credited to participants with a net credit position from 1:15 p.m. to

		1:30 p.m.
Trinidad and Tobago	T+1	Cheques presented for collection are sent to head offices of banks between 5:30 p.m. same day and 8:30 a.m. of T + 1. Some banks also exchange diskettes with cheque information for direct upload to their internal systems. Settlement starts at Central Bank at 9:30 a.m. each day. Cheques are validated during the course of the day, T+6 to process returned and dishonoured cheques.
Uruguay	T+1	Cheques denominated in either local currency or U.S$ processed at clearinghouse. Exchange of physical items takes place between 11:00 pm - 11:45 p.m. of day T. Cheque information is sent to clearinghouse before 12:30 am of T + 1. A first multilateral net settlement balance is calculated at 10:00 a.m. On T + 1 between 10:30 a.m-11:30 a.m., a rejected items session takes place. Cheques can be endorsed several times without limit.
Venezuela	T+1	Clearinghouse calculates multilateral net positions, informs the participants from 2:30 p.m-3:00 p.m. of T + 1 after returned items session has occurred. Clearinghouse does not assume any responsibility on cheque payments. Banks make claim among themselves for the reversed cheques