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Beyond LIBOR: Money Markets and the Illusion of Representativeness

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Abstract: Money market benchmarks are important indicators for economic agents. They are also crucial for central banks in assessing the functioning of the interest rate channel of the monetary transmission mechanism. However, whereas the unsecured interbank money market conventionally has been seen as encompassing instruments with maturities up to one year, it appears as if it consists of two markets. The ultra-short-term money market (typically just one day) is large, liquid and traded regularly. The term money market (one, three or six months), by contrast, is small, illiquid and rarely traded. This paper explores the feasibility of creating and maintaining a money market benchmark which does not represent an underlying liquid market. From a sociological perspective, it addresses two critical aspects of financial benchmarks: i) that they are related to but separate and distinct from the objects determining them and ii) that they are measurements and as such cannot be bought or sold (Stenfors and Lindo 2018). By doing so, the paper also reflects upon the desire by financial regulators following the LIBOR manipulation scandal to replace estimation-based by transaction-based benchmarks, as well as some challenges and contradictions in conventional central banking theory.

Keywords: Bank of Zambia; banks; benchmarks; Eurodollar market; LIBOR; monetary transmission mechanism; reference rates

JEL Classification Numbers: B52; E43; E52; G15; G28

Money market benchmarks are important indicators for economic agents. They act as reference rates and facilitate risk management through the pricing of financial products such as floating-rate loans, mortgages and derivatives. They are also used to measure and compare performance, such as investment returns and funding costs.

From a policy perspective, money market benchmarks are crucial for central banks in assessing the functioning of the interest rate channel of the monetary transmission mechanism (ECB 2020a). The logic underpinning the process by how monetary policy decisions affect interest rates and expectations, and thereby prices in the wider economy, has become widely accepted in mainstream economic theory and institutionalised within policymaking. It has also become synonymous with the through-process of an increasing number of inflation-targeting regimes, which have also expanded to include developing countries with limited or highly illiquid domestic money markets.[1]

The first stage of the monetary transmission mechanism involves borrowing and lending among banks. Money market benchmarks are assumed to reflect this activity, namely, banks' funding wholesale costs (Hou and Skeie 2014). Indeed, a significant number of financial instruments are linked to the unsecured interbank term markets due to, in part, their historical emergence as they were perceived as good proxies for bank funding costs. However, money market benchmarks started to receive considerable attention following the structural changes in the underlying markets after the 2007-08 global financial crisis and the 2012 London Interbank Offered Rate (LIBOR) manipulation scandal. With financial contracts of more than USD 400 trillion referenced to it, LIBOR is the world's most widely used financial benchmark (Schrimf and Sushko 2019).[2]

LIBOR and similar benchmarks in other jurisdictions are determined using a poll of selected banks that submit estimated interest rates at which they could borrow funds from the unsecured money market. The rates submitted by a panel of banks are not anchored on actual transactions but are judgement-based. This provided incentives for banks to manipulate their interest rate submissions. Banks were underreporting their interest rate submissions to signal their financial strength and to profit from their large derivative positions (BIS 2013; Duffie and Stein 2015). In this regard, LIBOR was deemed 'unrepresentative' of the money market benchmark.

[1] However, the adoption of inflation-targeting especially by developing and emerging countries has been critiqued on a number of issues including the primary role given to price stability at the cost of unemployment and growth, the consideration that inflation is a demand-pull if not the only monetary phenomenon, as well as challenges associated with the major role of short-term interest rates as the monetary policy instrument (Kaltenbrunner and Painceira 2017; Argitis 2008).

[2] Most of this amount includes the notional value of derivatives, and therefore the actual net exposure is lower (Schrimpf and Sushko 2019).

According to IOSCO (2013), the attributes of a good benchmark include robustness and resilience, reliability, usability, transparency and *representativeness*. Whereas all these attributes are essential, representativeness is arguably the most fundamental. It refers to the fact that interest rate benchmarks should reflect the economic realities of the underlying market (Brousseau et al 2013). A reflection of economic realities entail that a money market benchmark must mirror a) the cost of actual transactions in the underlying market and b) the source of funds for financial intermediaries (BIS 2013). The first has been regarded as the most significant criterion for assessing representativeness by financial regulators (Schrimpf and Sushko 2019). Put simply, a money market benchmark that is not based on actual market transactions is not representative and, therefore, flawed.

The End of LIBOR

LIBOR's de-facto death sentence was delivered by Andrew Bailey, Chief Executive of the FCA on 27 July 2017 (FCA 2017). In his speech, the UK financial regulator stated that "the underlying market that LIBOR seeks to measure – the market for unsecured wholesale term lending to banks – is no longer sufficiently active." He continued by questioning the sustainability of LIBOR: "If an active market does not exist, how can even the best run benchmark measure it?"

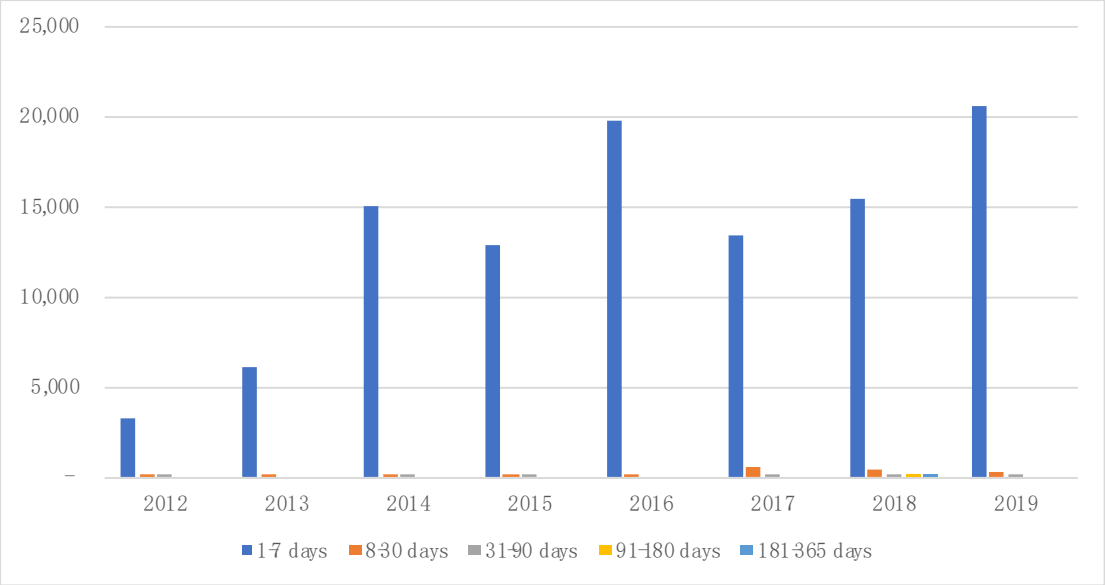
The observation was not confined to the UK market. A similar picture had been revealed in other major markets – including the US. According to data from the ECB (2020b), the unsecured overnight segment accounts for over 98% of the borrowing volume in the euro area. Just around 1% of the turnover takes place in maturities longer than one week. According to the Bank of England (2020b), the transaction-based submissions in the three-month LIBOR dropped to zero during the early days of the Covid-19 pandemic. During the same period, more than 50% of the 35 published LIBOR rates across all currencies did not have transaction-based submissions at all. However, Alexis Stenfors and Duncan Lindo (2018) suggest that the lack of transactions in the term money markets is not limited to crises and turbulent episodes. Instead, they argue that a gradual decline started well before the financial crisis of 2007-08. Problematically, while general information is available on unsecured money markets activity, granular data on interbank markets is not readily available to the public. The over-the-counter nature of money markets makes detailed empirical assessments extremely challenging.

Fortunately, we have obtained a unique dataset from the Bank of Zambia to illuminate more on these markets. Zambia is considering the introduction of term interbank reference rates. Robust money market benchmarks are essential for Zambia, considering that it is one of the countries that has institutionalised monetary transmission mechanism in its policies. Zambia revised its monetary policy operations framework in April 2012 as it

transitions towards full-fledged inflation targeting. The data constitutes every single domestic interbank transaction including trading volumes, interest rates, counterparties and type of collateral, for the period April 2012 to December 2019. To illuminate the money market specificities in the Zambian unsecured interbank money market, we use traditional liquidity metrics such as the number of trades and trading volumes (turnover) as proxies (Sarr and Lybek 2002).

Figure 1 shows the turnover in the Zambian unsecured interbank money market by maturity segment between 2012 and 2019.

Figure 1: Cumulative turnover in the Zambian unsecured interbank money market (in millions of kwacha)

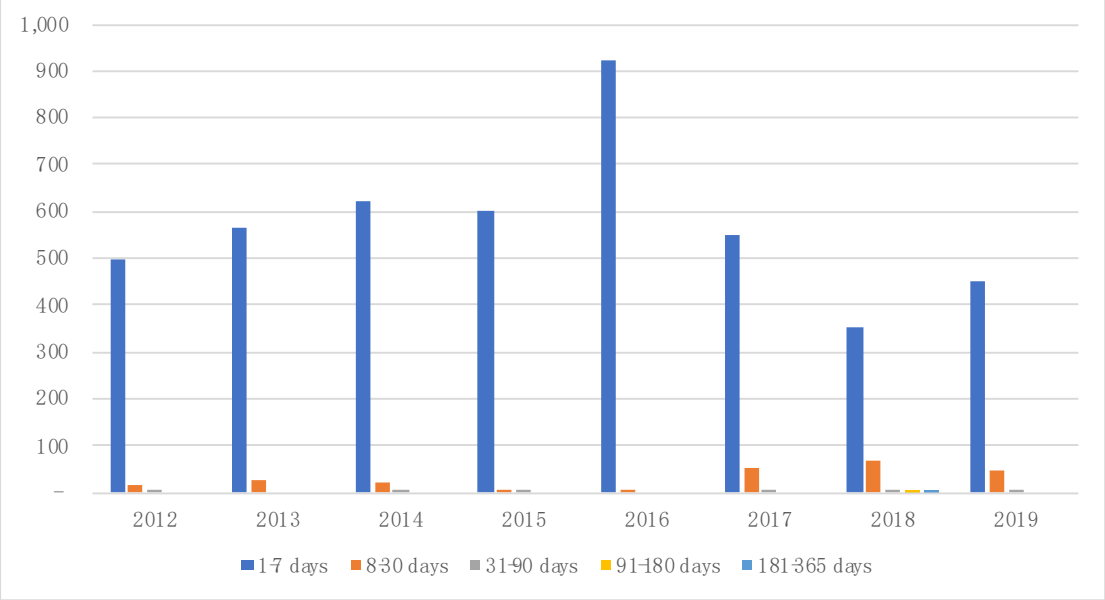


Sources: Bank of Zambia and authors' calculations.

As can be seen, the market has grown from less than 5 billion Zambian kwacha in 2012 to over 20 billion in 2019. In US dollar terms, however, the change is somewhat less pronounced: a doubling to approximately 1.5 billion US dollars in 2019. Nonetheless, the vast bulk of the turnover (98.2 per cent) is made up of trades maturity in 7 days or less. Money market turnover involving maturities longer than 31 days account for just 0.1 per cent of the whole market.

A similar picture is observed when market liquidity is measured by the number of trades per maturity category for the same period (Figure 2).

Figure 2: Total number of trades per maturity category in the Zambian unsecured interbank market, April 2012 – December 2019.

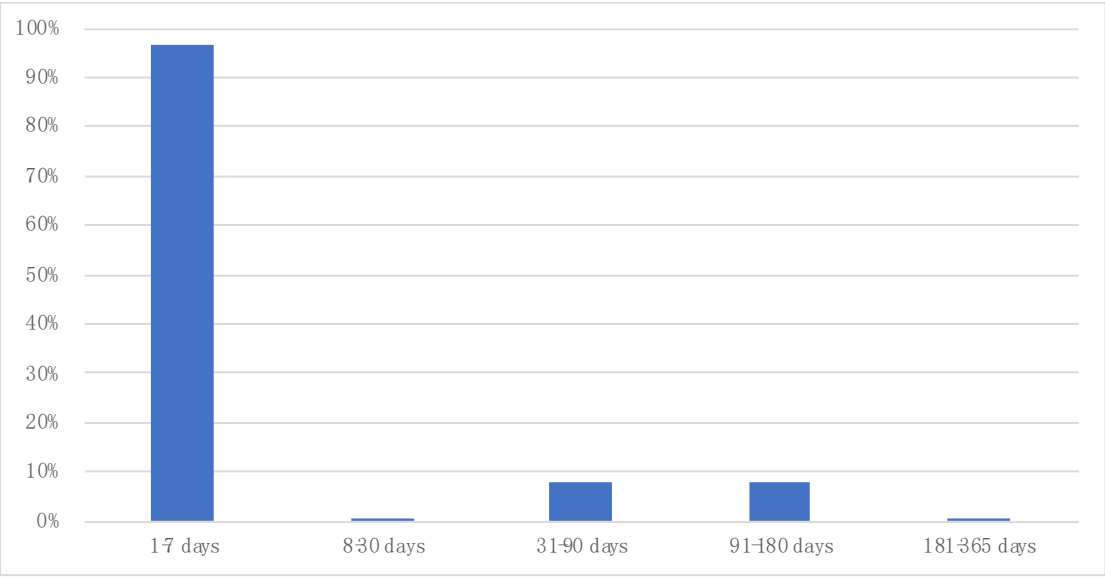


Sources: Bank of Zambia and authors' calculations.

During the period studied, the number of interbank trades has ranged between 429 (in 2018) and 922 (in 2016). Notably, again, is the almost complete absence of deals involving maturities longer than seven days. In 2013 and 2016, there were no transactions at all above 30 days. Indeed, trades in the two longest categories (91-180 and 181-365 days) were only reported in 2018. In sum, notable is that liquidity is limited to the ultra-short-term interbank market (1-7 days) and very limited in the term interbank market.

To further demonstrate the differences between the ultra-short-term and the other maturity categories, the percentage of days with observed trading activity across maturity categories is presented in Figure 3.

Figure 3: Days with observed trading activity by maturity category (in percent)



Sources: Bank of Zambia and authors' calculations. Note: The percentage is calculated by dividing the number of business days with observed trading activity by the total number of business days in the sample period.

Notable is that while the ultra-short-term segment has observed trading volume over 95 per cent of the time, the term interbank market is characterised by very low percentages (below 10 per cent).

The Zambian money market is minuscule in comparison with the developed markets that underpin LIBOR. However, there are also striking similarities echoing the observations made by central banks and regulators in Europe and the US. Put together; the empirical evidence points to a clear distinction between the 'ultra-short-term' and the 'term' money market. It appears as if the unsecured interbank money market consists of *two* markets. The ultra-short-term money market (up to one week, but typically just one day) is relatively large, liquid and traded regularly. The term money market (beyond one week, but generally conceptualised as one, three or six months), however, is small, illiquid and rarely traded.

Maturity and Representativeness

The distinction between the ultra-short-term money market and term money market is paramount because it highlights the issue of 'representativeness'. Money market benchmarks seem to be representative of money markets *as a whole*, but not when distinguishing it according to the term to maturity. Benchmarks, such as LIBOR, almost exclusively refer to the *term* money market (i.e. the Eurodollar market), whereas practically all activity takes place in the *ultra-short-term* market.

Treating the ultra-short-term money market and term money market as synonyms is obviously both practical and convenient. After all, they both represent the 'money market'. For instance, in 'The Economics of Money, Banking and Financial Markets', Frederic S. Mishkin (2019, 77) defines the money market as a financial market in which "only short-term debt instruments (generally those with original maturity terms of less than one year) are traded". The author is not only Professor and a former member of the Board of Governors of the Federal Reserve System but also the author of one of the widely read academic textbooks on the topic. Likewise, in 'The Handbook of Fixed Income Securities', Frank J. Fabozzi (2001, 250), states that "money market instruments are debt obligations that at issuance have a maturity of one year or less." Written by another authority, the classic 1,300-page handbook can be found across trading floors around the world. Thus, in terms of their term to maturity, money market instruments have tended to be defined and distinguished in relation to the long-term capital market, with maturities beyond one year. As Thorstein Veblen (1899, 145) states, "So soon as a given proclivity or a given point of view has won acceptance as an authoritative

standard or norm of life it will react upon the character of the members of the society which has accepted it as a norm. It will, to some extent, shape their habits of thought."

Human decisions are based on "assuming that the existing state of affairs will continue indefinitely — except when we have specific reasons to expect a change" (Keynes 1936, 152). This means people tend to assume that the accepted standard or convention is correct, however arrived at. The money market definition has been accepted as a standard and therefore influenced people's thoughts, habits and institutions over time. Fundamentally, however, a money market benchmark needs to represent the underlying money market. Otherwise, it is not fit for purpose. The money market we typically refer to today emerged with the innovation of the Eurodollar market in 1957. The Eurodollar market multiplied and spurred a range of new financial innovations in the form of money market benchmarks (e.g. LIBOR), new financial instruments (e.g. Eurobonds and derivatives such as Eurodollar futures linked to LIBOR) and other banking activities (e.g. off-shore banking). Money market benchmarks did not 'evolve' from money markets. They were invented in the 1980s for a specific purpose: to enable the innovation and growth of new forms of banking activities. The derivatives market, in particular, expanded rapidly with the advent of securitisation and the 1988 Basel Accord regulatory changes that were introduced to manage settlement and credit risk. This regulation favoured the growth of off-balance sheet items such as derivatives and penalised on-balance sheet items – and Eurodollar deposits, in particular (Stenfors and Lindo 2018).

Gradually, banks began to shift away from the term money market towards financial derivatives and foreign exchange swaps (Stenfors 2019). However, although the *overall* money market continued to grow, maturities became, on balance, shorter. As Alexis Stenfors and Duncan Lindo (2018, 182) argue, this market "had little to do with interest rate expectations and credit and more to do with daily funding and liquidity requirements to square up the bank balances." Indeed, trading in the ultra-short-term interbank money market category is mainly a liquidity management operation. Financial intermediaries use this segment of the market to square off their long or short positions, which from their daily obligations and inflows. The daily obligations include, among others, customer payments and central bank statutory reserve requirements (SRRs). Banks are required by central banks to hold a certain portion of their deposit liabilities with the central bank as SRRs for prudential and monetary policy purposes.[3] Long positions, on the other hand, arise from unexpected cash inflows. Thus, the term and ultra-term money markets have diverged over time. However, whereas their uses have become vastly different in practice, the two maturity segments continue to be treated as one single market in theory and by definition.

It appears as if the money market definition or theory has 'performed' the illusion that the money market is a 'unit' representative of 'one market'. In this case as Donald

[3] For example, Zambia's minimum SRR is currently at 9 per cent and is applied on commercial banks' domestic and foreign currency liabilities (Bank of Zambia 2019).

MacKenzie and Yuval Millo (2003, 108) state: "Economics does not describe an existing external 'economy,' but brings that economy into being: economics performs the economy, creating the phenomena it describes." In this context, performativity entails that economics "does things, rather than simply describing (with greater or lesser degrees of accuracy) an external reality" (MacKenzie, Muniesa and Sui 2007, 55). The money market definition or theory seems to have become distant from what it intends to 'represent'. As Michel Callon (1998) argues, if economic theory does not represent the marketplace, striving to make generalisations can result in detached theory from reality.

This phenomenon extends to a wide range of financial instruments, markets and institutions and processes. For instance, Alexis Stenfors and Duncan Lindo (2018) show how the evolution of the financial derivatives market helped to create an illusion that money markets were synonymous with money market benchmarks (such as LIBOR). This led individuals, corporates and policymakers to make decisions which were based upon the assumption that the benchmark was a market in itself. However, benchmarks, indices and measurements cannot, of course, be bought and sold. Only contracts *referring* to them can.

Further, Alexis Stenfors and Masayuki Susai illustrate how the conventional usage of specific quantitative metrics serves to overestimate the competitiveness and liquidity of foreign exchange markets (Stenfors, 2018; Stenfors and Susai 2018). Other studies demonstrate how the prominent application of mathematical equations in finance has suppressed the questioning of their underlying assumptions – and thereby led to distorted assessments about opportunities and risks in markets (MacKenzie and Millo 2013; Stenfors 2019; Chatziantoniou et al 2020). Seen through this lens, the detachment of theory from reality seems to have created a false perception and reinforced an illusion of 'one' representative money market.

Beyond LIBOR

The search for new benchmarks to replace LIBOR suggest that old habits have come under threat. Indeed, to ensure representativeness, financial market regulators have recommended a shift toward transaction-based reference rates supported by sufficient liquidity in underlying markets (BIS 2013; IOSCO 2013). In this regard, work is already underway in jurisdictions such as the United States and the United Kingdom to shift towards financial benchmarks anchored on actual transactions (FSB 2019). Indeed, to replace the US dollar LIBOR, US authorities have selected the Secured Overnight Financing Rate (SOFR), which measures the cost of overnight cash transactions collateralised by Treasury securities (Federal Reserve Bank of New York 2020). The British pound LIBOR will be

replaced by the Sterling Overnight Interbank Average (SONIA), which is an average based on overnight unsecured transactions in British pounds (Bank of England 2020a).

However, evidence points to the fact that the *overnight* market, which is large and liquid, can only represent *overnight benchmarks*. In contrast, illiquid tenors, such as three-month and six-month, can only be associated with the three-month and six-month reference rates, respectively. To replicate *term* LIBORs, the Alternative Reference Rates Committee (2019) provides recommendations on how overnight risk-free rates such as SOFR can be used to calculate term rates using two conventions, namely 'in advance' or 'in arrears'. The former uses historical data and compounds the overnight market and obtains a rate which is known upfront for the financial contract. The drawback of this rate is that it does not represent underlying conditions of the current period. The 'arrears' convention attempts to address this drawback by accruing interest in the interest period. However, while both mathematical methods of compounding overnight rates are useful, they are only representative of overnight markets and reinforce the 'illusion' of representativeness in term money markets.

Replacing an old benchmark with another does not pose a threat to the derivatives market as such, despite complex novation processes, legal challenges and practical challenges in creating new instruments and markets. As Alexis Stenfors and Duncan Lindo (2018) show, the derivatives market has continued to grow despite a gradual erosion of the term money market. The death of LIBOR will automatically lead to the disappearance of derivatives linked to it. However, new benchmarks and derivatives referencing these will be created to replace them.

Nonetheless, the transition away from estimation-based based benchmarks representing a market which no longer exists will pose challenges for the logic of the interest channel of the monetary transmission mechanism. Central banks and banks borrow and lend to each other in the overnight market, but if there is no market representing borrowing and lending beyond just a few days, how can the effectiveness of policymaking be assessed? Perhaps more importantly, how can strains in the financial system be accurately and reliably observed? This is critical, especially for developing economies with less liquid markets that have institutionalised the monetary transmission mechanism in their inflation-targeting policies.

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