



# Developing an Islamic Financial Returns Benchmark for Islamic Financial Institutions

Islamic Research and Training Institute

October 2020

## I. Introduction

Benchmark rates are regularly updated reference rates for credit transactions that are publicly accessible. They are a useful basis for many kinds of financial contracts. Conventionally, benchmark rates are interest rates that are calculated by an independent body, most often to reflect the cost of borrowing money in different markets. They play a key role in the financial system, the banking system and the economy overall. The importance of benchmark rates arises from the fact that these are widely used by individuals and organizations throughout the economic system. For example, banks use them when lending to individuals or corporate clients. A bank might agree to lend money to a company at an agreed interest rate that is set at a particular benchmark rate plus one percent – meaning that the company would pay interest of one percent more than the current benchmark rate. So, the cost of the loan goes up if the benchmark rate goes up, and down if the benchmark rate drops. In this case, the benchmark can be a reliable, independent, and relatively simple reference for all involved parties.

If a benchmark rate properly reflects the economic costs of financing, it can help economic decision makers better understand the functioning of financial markets and the availability of credit in the system. Benchmark rates are useful as long as they are considered reliable and unbiased – ideally, they should be calculated in a transparent manner, and the rates should be easily and publicly accessible. If a contract is based on a reliable benchmark rate, neither party can influence the agreed cost of funding. This means that a dependable benchmark rate can ensure that the value of a contract remains impartial and indisputable. Given the economic importance of benchmark rates, it is critical that their reliability is ensured by clear governance structures and transparent methodologies.

In the context of Islamic finance, the need for a benchmark arises from its intended use in credit sales by parties involved in Islamic credit transactions, e.g. financial institutions, central banks, businesses and individuals. Islamic financial institutions have found it convenient to use the same interest rate benchmark as used by their conventional counterparts, given that such practice was not deemed impermissible by at least some Shariah scholars. However, proponents of an alternative Islamic benchmark rate argue that permissibility was accorded to such practice initially as an exception under the law of necessity for pricing the transactions. Currently, this practice has become widely prevalent and may act as deterrent against the purity and realization of the objectives of Islamic finance.

Proponents seek to build a case in favor of the Islamic alternative on the following grounds.

- The time value of money is different from time value of economic resources.
- The use of conventional benchmarks results in the delinking of real economy from the financial economy defeating the very rationale of Islamic finance.

- The use of conventional benchmarks also contributes to the perception that Islamic finance may not be differentiated enough from its conventional counterpart, since the same interest rate benchmark is used by both leading to similar products and pricing. The practice, thus, entails reputational risk for Islamic finance and has an adverse impact on the industry's reputation, credibility and authenticity in the eyes of the general public.
- Finally, the conventional benchmarks have come under clouds on grounds of poor governance, fairness and transparency. This is most visible in the LIBOR scandal that emerged in the aftermath of global financial crisis.<sup>1</sup>

Given that the UK Financial Conduct Authority decided to discontinue LIBOR by the end of 2021,<sup>2</sup> the issue of a proper benchmark for Islamic finance has resurfaced again. The objective of this Concept Note is to outline a framework to develop a reliable and practical alternative.

## II. Review of Previous Proposals

The search for an Islamic benchmark rate has motivated Islamic economists from time to time to undertake serious research aimed at finding/developing an alternative benchmark rate that is appropriate in the context of an Islamic economic and financial system. Such efforts did result in several studies of academic nature, but fell short of developing a practical, transparent and industry-acceptable benchmark.

Mirakhor (1996) asserts that the rate of return on investment for projects with the same degree of risk can be calculated from financial market data using Tobin's theory<sup>3</sup>. Zarqa (1983) preferred the expected rate of return on real investment to define an ideal benchmark rate.<sup>4</sup> Abji (1985) argued that the average expected rate is estimated by the relative weights of the returns of the similar investments which are characterized by the same degree of risk for the project under study. Shehata (1978) defined this rate as the average percentage of expected profits to investment capital. Al-Jarhi (1981) opted for the index of the rate of return on short-term central deposits<sup>5</sup>, which he called (denominator), and these deposits are investment accounts opened by the Central Bank with commercial banks to invest in the productive sector.<sup>6</sup>

---

<sup>1</sup> <https://www.ft.com/libor-scandal>.

<sup>2</sup> <https://www.fca.org.uk/markets/libor>.

<sup>3</sup> Mirakhor, A. (1996) "Cost of Capital and Investment in a Non-Interest Economy," *Islamic Economic Studies*, vol. 4, pp. 35-46.

<sup>4</sup> Zarqa, A. (1983). "An Islamic Perspective on the Economics of Discounting in Project Evaluation" in Ahmed et al ed. *Fiscal Policy and Resource Allocation in Islam*, International Centre of Research in Islamic Economics, KAAU and Institute of Policy Studies, pp.203-34.

<sup>5</sup> Al-Jarhi, M. (1980) A Monetary and Financial Structure for an Interest-Free Economy: Institutions, Mechanism and Policy, updated version (2004) available at <https://pdfs.semanticscholar.org/>.

<sup>6</sup> These references, and some others, can be found at: Gaith, M. (2010) *Theory of Time Discounting in Islamic Economics*, International Institute for Islamic Thought, USA (Arabic).

ISRA develops a benchmark based on CAPM.<sup>7</sup> Since CAPM involves interest, they propose using rates of Islamic treasury bills or Sukuk. Unfortunately, these rates in turn depend on LIBOR or similar conventional interest rate reference.

### *Islamic Interbank Benchmark Rate (IIBR)*

The IIBR was launched as the world's first Islamic finance benchmark rate, to provide an objective and dedicated indicator for the average expected return on sharia-compliant short-term interbank funding. It was established by Thomson Reuters in cooperation with IsDB, AAOIFI, Bahrain, Association of Banks, Hawkamah Institute for Corporate Governance, and a number of major Islamic Banks.

While the IIBR was a significant milestone, it lost the momentum and traction that it once had. Moreover, the IIBR is an average of actual rates of participating banks, these rates in turn depend ultimately on other interest reference rates.

### *What Do We Need?*

A study to examine this all-important issue was initiated in 2007 by a team of researchers from IRTI. The study argues that the Islamic benchmark rate must have certain essential properties:

- It must be independent from interest rates.
- It should be based on or backed by sound economic rationale.
- It should be simple and easy to produce.
- It should have wide acceptance and potentially reduce the severity of financial crises.

Unlike some rates suggested as above, an Islamic benchmark should also avoid circular referencing. This precludes the use of several variables/indices, such as, Islamic banks' profitability, returns on Islamic deposits, sukuk rate of return; these rates are in some way determined by the conventional interest rate; and therefore, cannot be used as benchmarks themselves.

## **III. Defining the Benchmark**

From the investor's perspective, return on financing must possess two essential properties:

- To preserve the real value of capital.
- To compensate for the opportunity cost of investing the money.

These two criteria define what the financier requires at the minimum.

---

<sup>7</sup> M.A. Omar, A. Noor, and A. Meera (2010) "An Islamic Pricing Benchmark," International Sharia Research Academy, Research Paper no. 17.

The real value is preserved by compensating for inflation. However, since financing by design is a contract with deferred payment, expected inflation must be accounted for at contract time. Therefore, for an investor at the time of contracting, it is the expected inflation rate that is the “risk-free” base rate. This point may be elaborated from another perspective. Government debt is risk-free because it is issued by a sovereign who can issue money. But issuing money is accompanied by risk of inflation. Hence, the latter arguably substitutes or trades-off for credit risk.

For the opportunity cost, there is no unique reference or benchmark: each investor or financial institution may use the expected rate of return of a sector of concern as a benchmark. Overall, however, we may consider the expected growth rate of the economy as a whole as a base rate. This rate is the minimum rate of return of the real economy. By combining expected inflation and expected growth rate of the real economy, a financier will be able to determine the *minimum* rate of return on nominal capital.

These two components correspond to the economic definition of interest. Interest rate for a given maturity consists of the following components:

1. Rental rate of capital, and
2. Expected inflation.<sup>8</sup>

Since rental rate of physical capital may not be always available, we may instead use expected growth rate of the real economy over the defined period. Hence,

$$[1] \quad i = r^e + \pi^e,$$

where  $i$  is nominal rate of return,  $r^e$  is expected growth rate of the economy, and  $\pi^e$  is expected inflation.

The same formula can be arrived at if we consider the benchmark as the growth rate of nominal GDP. Following Quantity Theory of Money, nominal GDP,  $N$ , equals real GDP,  $Q$ , time price level  $P$ :

$$[2] \quad N = P \cdot Q$$

Taking the logarithms of both sides of [2], and taking the first time-difference, we end up with:

$$[3] \quad \dot{N} = \dot{P} + \dot{Q},$$

where the “dot” represents the growth rate. Using expected rather than actual rate, the result will be identical to the formula [1] above.

---

<sup>8</sup> See e.g. S. Pratt and R. Grabowski (2008) *Cost of Capital: Applications and Examples*, 3<sup>rd</sup> ed., John Wiley & Sons, p. 71.

The proposed benchmark has strong similarities with the framework of monetary policy proposed by Stanford University economist John Taylor. Taylor recommended a formula for policy interest rate that is a combination of three components:

- (i) the long-term real growth rate of the economy,
- (ii) expected inflation rate, and
- (iii) policy components.

Taylor used historical data to demonstrate how this formula (if implemented by the Federal Reserve) could have helped avert the last global financial crisis.<sup>9</sup>

### *Merits of the Proposed Benchmark*

What are the merits of this benchmark in [1]? From the above discussion, it is clear that the benchmark is:

1. Independent of interest. There is no interest variable on the right-hand-side of the formula.
2. It is widely accepted as an essential part of conventional cost of capital, and readily derived from economic theory.
3. It is forward-looking rather than backward-looking benchmark, as it is the case in LIBOR.
4. Within the framework of Taylor's rule, the benchmark can contribute to financial stability.
5. From an Islamic perspective, it is based on economic variables that are directly related to trade and production.

An Islamic benchmark has the same non-policy components as the Taylor's rule, and is independent of LIBOR. And similar to Taylor's rule, central banks in Islamic countries may alter the benchmark rates in response to changes in economic conditions to achieve - what the Taylor's rule seeks to achieve - by adjusting and setting prudent rates for the short-term stabilization of the economy while still maintaining long-term growth. The Taylor rule suggests that the central banks should raise rates when inflation is above target or when economic growth is too high and above potential. It also suggests that the rates should be lowered when inflation is below the target level or when GDP growth is too slow and below potential.

### *Benchmark vs. Pricing*

It may be noted that the proposed benchmark is not a pricing formula. Put differently, the pricing of credit sales = benchmark + costs + risk premium + market component. The cost component reflects the operation and other costs of the financial institution; risk premium is compensation for risk; the market component reflects the gap between supply and demand that the institution needs to adjust its price to (if it chooses to). The market component might be positive or negative depending on market conditions (similar to the policy component of the Taylor rule).

---

<sup>9</sup> J. Taylor (2009) "The Financial Crisis and the Policy Responses: An Empirical Analysis of What Went Wrong," NBER.

The benchmark highlights the expected real opportunity costs (expected growth in real GDP), and the expected loss in purchasing power (expected inflation). Investors are free to adjust their pricing to these factors, but economically, rational investors will converge towards the benchmark. Further, the proposed benchmark emphasizes the value of forward-looking expectations, compared to the existing backward-looking averages (LIBOR and similar indicators such as the IIBR). As such, the benchmark will be useful not only to the financial industry (Islamic and conventional) but to other sectors of the economy as well as to policy makers.

#### **IV. Inflation-linked Papers**

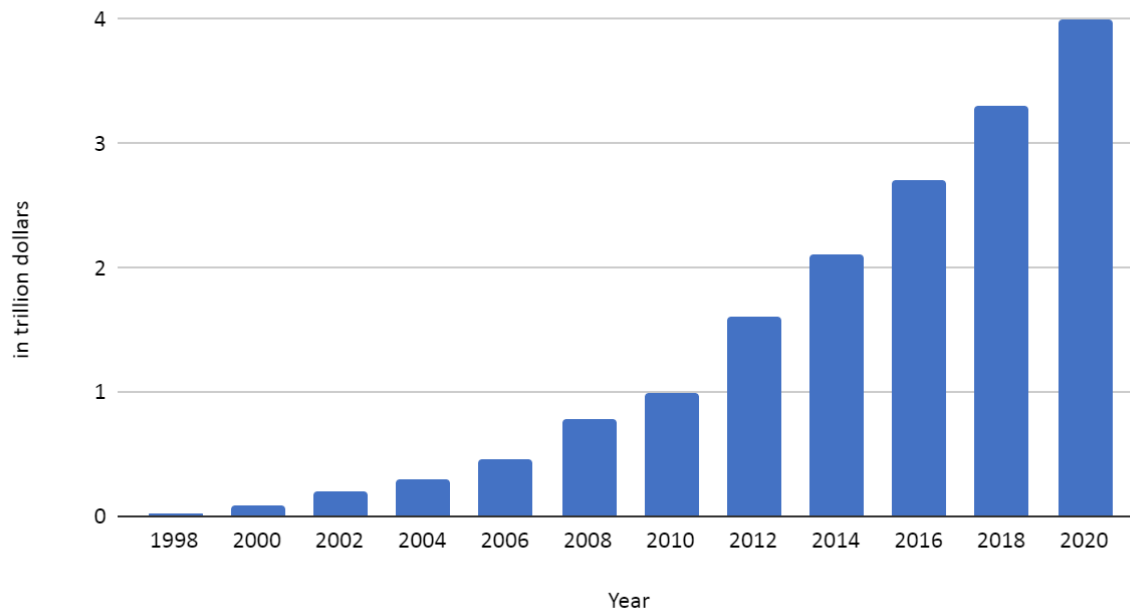
Investors realized long ago the need to account for inflation when offering debt financing. The earliest recorded inflation-linked bonds (ILBs) were issued by the Commonwealth of Massachusetts in 1780 during the Revolutionary War. Much later, emerging market countries began issuing ILBs in the 1960s. In the 1980s, the UK was the first major developed market to introduce “linkers” to the market. Several other countries followed, including Australia, Canada, Mexico and Sweden.

In January 1997, the U.S. began issuing Treasury Inflation-Protected Securities (TIPS), now the largest component of the global ILB market. Today inflation-linked bonds are typically sold by governments in an effort to reduce borrowing costs and broaden their investor base. Corporations have occasionally issued inflation-linked bonds for the same reasons, but the total amount has been relatively small.

ILBs are designed to help protect investors from inflation. Primarily issued by sovereign governments, such as the U.S. and the UK, ILBs are indexed to inflation so that the principal and interest payments rise and fall with the rate of inflation. Inflation can significantly erode investors’ purchasing power, and ILBs can potentially provide protection from inflation’s effects. ILBs may also offer additional benefits in a broader portfolio context.

The overall inflation-linked bond market is nearly \$3 trillion in size and is dominated by a few larger issuers. US TIPS are almost 40% of the amount outstanding. Other large issuers are primarily European, with United Kingdom issuance totalling €733 billion, France issuance totalling €230 billion, and Italy issuance totalling €154 billion of outstanding debt. Main issuers of the ILBs are banks or financial institutions, but also industrial and services companies.

## ILBs Market Growth



### ILBs Market by country

Source: Factset; IRTI compilation

The table below shows four of the Inflation indexed Sukuks, present on the capital markets. The issuer is Hazine Mustesarligi Varlik Kiralama AS, which operates as a government agency.

Issuer Name	Maturity	Issue Date	Amount Out (in USD)
Hazine Mustesarligi Varlik Kiralama AS	10/30/2024	11/6/2019	299069150.4
Hazine Mustesarligi Varlik Kiralama AS	10/12/2022	10/18/2017	149736950
Hazine Mustesarligi Varlik Kiralama AS	6/7/2023	6/13/2018	94463649.2

These developments in capital markets show that:

1. The market appreciates the need for (expected) inflation to protect their investments, and
2. The financial markets are still behind in endorsing expected inflation and expected real growth as crucial components of the financial returns benchmark.

The currently proposed alternatives to LIBOR by many regulators (like SONIA, SOFR, ESTER, etc.) do not represent expected inflation and expected growth of real output. The need and the opportunity for the proposed benchmark are therefore more apparent today than before.



## V. Developing the Benchmark

Developing a benchmark essentially involves estimating expected variables. There are two key considerations while developing the benchmark:

- (i) use of surveys and
- (ii) use of blockchain technology.

### *Surveys*

Available empirical evidence indicates that surveys are more accurate than many other methods of estimating expected variables. A well-known study examined the forecasting power of four alternative methods of forecasting U.S. inflation out-of-sample: time-series ARIMA models; regressions using real activity measures motivated from the Phillips curve; term structure models that include linear, non-linear, and arbitrage-free specifications; and survey-based measures. It also investigated several methods of combining forecasts. The results showed that surveys in general outperform the other forecasting methods. Further, there was little evidence that combining forecasts produced superior forecasts to survey information alone.<sup>10</sup>

Hence, conducting regular surveys of various sectors for necessary variables would be desirable. Surveys should be done for expected prices as well as expected quantities or volumes. Expected prices are used to calculate expected inflation. Expected quantities are used to estimate expected real economic growth. In case of consumer prices, the participants in the survey would include consumers, major groceries, etc. while in case of producer prices the participants would include the major producers. Rentals may be estimated by including the leasing companies, real estate, hotels, etc. in the survey. From expected prices one may calculate expected inflation. Similarly, the expected quantities may be estimated by surveying the above entities. From expected quantities, the expected real growth rate may be calculated.

### *Blockchain Technology*

The use of the blockchain technology is very relevant for conducting surveys of expectations. Blockchain can be very effective in verifying and validating the data, since the network can validate participants' identities and expected variables. This would also ensure that the data used and consequently, the benchmark rate estimated is transparent, observable, easy-to-compute and non-manipulative, fulfilling all the criteria for effective and efficient functioning of financial markets.

As highlighted earlier, there is considerable diversity of approaches among scholars in how they define and measure the Islamic alternative benchmark rate. Developing a consensus around "expected nominal long-term growth rate of the economy" as the benchmark rate requires

---

<sup>10</sup> Andrew A., G. Bekaert and M. Wei (2007), "Do Macro Variables, Asset Markets, or Surveys Forecast Inflation Better?" *Journal of Monetary Economics*, vol. 54, pp. 1163-1212.

considerable efforts and is a precondition for actual implementation of the rate and its acceptance by the Islamic finance industry.

Many, if not most, Islamic financial institutions currently use LIBOR and its country-specific variations as a reference in determining the expected rate of return in Shariah-compliant products. To move the IFIs from their comfort zones and try the untried is a challenge to be overcome.

However, it is felt that the above two challenges are best addressed by moving forward and develop a plan for operationalization of the suggested framework by IRTI. This will require development of a framework based on a detailed study of methodologies for expectation surveys in general and blockchain based methodology, in particular.

## **VI. Conducting the Expectations Survey**

As stated earlier, the proposed solution requires conducting surveys of various sectors for two critical variables - the expected prices as well as the expected quantities or volumes. Expected prices are used to calculate expected inflation. Expected quantities are used to estimate expected real growth. The following section reviews the survey methodologies of expected inflation.

### *Inflation Expectations*

Inflation expectations generally play at least two important roles for central banks across the globe. First, as important inputs into price and wage setting, they provide a summary statistic of where inflation is likely to be headed. Second, they may be used to assess the credibility of the central bank's inflation objective. Some measures of expectations are likely to be better suited for some purposes than others. All have different limitations. Not surprisingly, then, central banks rely on a range of measures. Measures of inflation expectations can be classified as:

- Forecasts based on surveys of professional forecasters;
- Forecasts based on surveys of households or firms; and
- Market price-based measures.

Professional forecasters' inflation forecasts are widely used. These economic agents are frequent and careful monitors of inflation developments. They are likely to be better informed and to respond faster than other agents. In some cases, the forecasts are collected by the central bank itself, but often they are obtained from external sources, such as Consensus Economics.

In the case of fixed event forecasts, the forecast horizon varies through the year, and may become shorter than the policy horizon. In contrast, fixed horizon forecasts are more easily comparable over time and easier to use for policy purposes. According to Svensson (1997), inflation targeters may be more interested in inflation expectations one to two years ahead, as this is the horizon where monetary policy will have its greatest impact and may have less use for shorter horizon forecasts. Another limitation is that professional forecasters face incentives to

make relatively extreme forecasts in order to maximize their publicity value. Being correct when other forecasters are also correct is unlikely to attract attention; in contrast, being correct when everyone else is wrong may have considerable marketing value. Consequently, forecasts by professional forecasters may be likely to deviate from the expectations of inflation used by price-setters and decision-makers in the economy.

The second way to measure inflation expectations is via surveys of households and firms. These are generally used to assess the credibility of the central bank and the degree to which inflation expectations are anchored. In some cases, they are also used to assess the degree of economic confidence and gather additional evidence missed by other measures. Expectations of households and firms are often criticized as poor predictors of inflation outcomes, given that they are too heavily influenced by food and energy prices. Despite this, if agents act on the basis of biased expectations, then it is important to understand the nature of that bias, since it will affect spending, pricing and wage setting.

Unfortunately, measures of firms' expectations are not widely available. Coibion and Gorodnichenko (2015) suggest using consumers' expectations as a proxy, since firms' expectations are likely to be similar. Kumar et al (2015) find that managers of firms tend to:

- Have a poor knowledge about the dynamics of inflation;
- Be unaware of the central bank's goals; and
- Display expectations that are not well anchored.

One risk common to all the measures is that the corresponding economic agents are not directly compensated based on the accuracy of their stated forecasts (Schuh, 2001). Accordingly, a subset of central banks uses measures extracted from financial market instruments (e.g. break-even inflation rates between nominal and real bonds) (Gürkaynak et al, 2010; De Pooter et al, 2014).

These are also typically available at high frequency, on a timely basis, and are often based on transactions among a large number of market participants. Moreover, they are often based on inflation outcomes at a constant horizon. Yet, even where financial market indicators of inflation expectations are available, these have a mixed record. For example, Bauer and McCarthy (2015) show that market-based inflation expectations are poor predictors of future inflation compared with surveys of professional forecasters and contain little forward-looking information about future inflation. This is partly because market-based measures reflect not just the expected level of inflation, but also market liquidity and the value of insurance against alternative inflation outcomes (Hördahl, 2009).

Focusing on household expectations, these generally exhibit greater bias, and more volatility, than those by professional forecasters. But they may still provide valuable information. For example, Coibion and Gorodnichenko (2015) find that, by using consumer expectations for US inflation in a Phillips curve instead of those of professional forecasters, they can explain the surprising absence of a persistent fall in inflation during the Great Recession. The reason is that consumers' inflation expectations, which respond more strongly to oil prices, actually rose

between 2009 and 2011. However, whether this is a more general relationship, or specific to this particular episode, is unclear. Relatedly, Binder (2015) argues that the expectations of “high-income, college-educated, male and working-age people” play the largest role in explaining inflation dynamics. In addition, as many central banks have indicated in their survey responses, inflation expectations are indicators of central bank credibility and the degree of confidence in the economy.

**Assessing the Anchoring of Inflation Expectations:** With the exception of the fixed exchange rate regimes, central banks use measures of inflation expectations to assess central bank credibility and/or the anchoring of expectations. Nearly all central banks use inflation forecasts from professional forecasters as one measure. And as most professional forecasts are available at horizons that are too short, such forecasts reflect shocks that drive inflation away from the target, as central banks have limited ability to control inflation at short horizons.

**Global Inflation Forecasts:** Inflation co-moves across countries and several papers have shown that lags of this common inflation can help to forecast country inflation (Kearns. 2016). The forecasts of global inflation have predictive power for global inflation at a medium horizon (12 months) but not at a longer horizon. Global inflation forecasts, and forecast errors, are correlated with survey forecasts and errors of oil and food prices, and global GDP growth, but not financial variables. For some countries, forecasts of global inflation improve the accuracy of forecasting regressions that include survey forecasts of country inflation. The forecasts of global inflation generally contain more information for forecasting country inflation than do lags of global inflation. However, for most countries, lagged or forecast global inflation does not improve the accuracy of survey forecasts of country inflation. Whatever information global inflation may include about country inflation, for most countries it seems that survey forecasts of country inflation have historically already incorporated that information. Given the apparent importance of global inflation, it is natural to ask: is global inflation forecastable? Moreover, if it is, do those forecasts help to forecast country inflation?

Global inflation may be employed to forecast country inflation by using survey-based forecasts of country inflation for a wide panel of countries, in contrast to univariate models that have been used in much of the existing literature. Even at a country level, it is difficult to forecast inflation using a model of its determinants given uncertainty about the nature of, and changes in, the structural relationships. The usual difficulties with accurately measuring the underlying determinants add to these challenges. At a global level, this is potentially even more complex given the differences in the inflation process across countries and the challenges of collating comparable data. Using survey forecasts to produce the global forecast is a promising approach given Faust and Wright (2013) find that subjective forecasts generally outperform model forecasts (at least for the United States).

#### *Central Bank Surveys on Inflation Expectations in Member Countries*

As reported by central banks in response to Bank for International Settlements (BIS) questionnaire (Sousa and Yetman, 2016) and (Moreno and Villar, 2010), the surveys of three

member countries are reported: Indonesia, Malaysia and Turkey in Table 1. The Table shows that periodical surveys (monthly and quarterly) are conducted by the authorities in these Member Countries. These surveys may be upgraded (using blockchain technology) and enhanced (conducted more frequently, e.g. weekly or bi-weekly), so that the results can be used by credit institutions at a large scale.

### *Consensus Economics*

Consensus Economics, founded in 1989, is the world's leading international economic survey organization and polls more than 700 economists each month to obtain their latest forecasts and views. Its surveys cover individual and consensus (mean, high and low) scenario estimates for the principal macroeconomic indicators including GDP growth, inflation, production, interest rates and exchange rates in over 100 countries, as well as more than 40 key energy and metal prices.

For several decades, journalists and researchers have been collecting and combining economic and financial forecasts using surveys. Consensus Forecasts ask the world's leading forecasters for their predictions for more than 1,000 variables from over 100 nations in the G7 and Western Europe, Eastern Europe, Asia Pacific and Latin America. Incoming survey responses are then processed using proprietary software and checked for accuracy, completeness and integrity. For the principal countries covered, the estimates of individual panelists for each economic indicator, along with the mean average are provided.

A significant body of academic and central bank research (see below) has concluded that group forecasts and, specifically, Consensus Forecasts have a better track record than most of the individual forecasts which make up the group, because few, if any, individuals manage to consistently outperform the group. While in any one year some forecasting panelists will probably do better than Consensus Forecasts in terms of predicting the correct outcome, these 'top performers' will vary from year to year and are very difficult to identify in advance. Consequently, using Consensus Forecasts which are surveyed from a group of expert economists can improve accuracy and enhance the work of investment managers, treasury executives, corporate planners, central bankers and government departments around the world.

**Table 1**

<b>Economy</b>	<b>Survey name</b>	<b>Inflation measure</b>	<b>Frequency</b>	<b>Population and number of respondents</b>	<b>Primary use</b>
<b>Indonesia</b>	Consumer Survey	CPI	Monthly	4,600 households	Gauging information about confidence
	Retail Sales Survey	Retail Sales Survey CPI Monthly 700 retailers Gauging information about confidence	Monthly	700 retailers	Gauging information about confidence
	Business Survey	CPI	Quarterly	Approximately 3,000 financial and non-financial corporations	Checking anchoring of expectations and gauging information about confidence
	Macroeconomic Indicators Forecasting Survey	CPI	Quarterly	25–35 professional forecasters	Checking anchoring of expectations and gauging information about confidence
	Consensus Forecasts	CPI	Monthly	Approximately 25 professional forecasters	Checking anchoring of expectations and gauging information about confidence
<b>Malaysia</b>	BNM Consumer Sentiment Survey*	General prices and prices of selected categories, one-year- ahead	Monthly	1,000 households	Monitoring credibility, checking anchoring of expectations, gauging information about confidence and assessing growth and inflation outlook
	BNM Quarterly Survey of Firms**	One-quarter-ahead CPI, average operating cost and selling prices	Quarterly and annual	Approximately 130 non-financial corporations	Monitoring credibility, checking anchoring of expectations, gauging information about confidence and assessing growth and inflation outlook
	BNM Consumer Sentiment Survey***	General prices and prices of selected categories, one-year- ahead	Monthly	1,000 households	Monitoring credibility, checking anchoring of expectations, gauging information about confidence and assessing growth and inflation outlook

	BNM Quarterly Survey of Firms****	One-quarter-ahead CPI, average operating cost and selling prices	Quarterly and annual	Approximately 130 non-financial corporations	Monitoring credibility, checking anchoring of expectations, gauging information about confidence and assessing growth and inflation outlook
	Analysts' Consensus forecast*****	One-year-ahead CPI	Monthly	Approximately 30 professional forecasters	Monitoring credibility, checking anchoring of expectations, gauging information about confidence and assessing growth and inflation outlook
<b>Turkey</b>	Survey of Expectations	CPI	Monthly	110 professional forecasters from financial and real sectors	Setting policy, monitoring credibility, checking anchoring of expectations and gauging information about confidence
	Business Tendency Survey	CPI, PPI	Monthly	2,659 senior managers of the manufacturing Industry	Gauging information about confidence
	Consumer Tendency Survey	CPI	Monthly	4,848 households	Gauging information about confidence

\* Survey conducted since 2013 and the data is not published.

\*\* Survey covers firms in the manufacturing, construction and services sector and also includes firms' expectation of their performance and outlook.

\*\*\* Survey conducted since 2013 and the data is not published.

\*\*\*\* Survey covers firms in the manufacturing, construction and services sector and also includes firms' expectation of their performance and outlook.

\*\*\*\*\* Published by Consensus Economics Inc.

*Source: Sousa and Yetman (2016) and Moreno and Villar (2010); IRTI staff compilation.*

According to Bates and Granger (1969), at least since the publication of *The Combination of Forecasts*, economists have known that combining forecasts from different sources can both improve accuracy and reduce forecaster error. In the intervening years, numerous studies have confirmed these conclusions, outlined conditions under which forecast combinations are most effective, and tried to explain why simple equal weights work so well relative to more sophisticated statistical techniques.

### *Blockchain-based Surveys*

Surveys are an essential source of primary data. However, over the years, due to technological improvements, questionable instances of information misappropriation and improper conduct while collecting data online have occurred (Sial Miah 2019 a, b). Recent developments in blockchain technology have sought to make surveys far more robust and reliable than ever before. The superior features of this technology that may be underlined arise out of its immutability and traceability and decentralized nature. The positive impact of blockchain on data collection through surveys can be shown through authenticity and safeguarding of user data.

**Authenticity;** Authenticity is a key factor when carrying out surveys or requiring completion of the questions. Authentication of participants from the survey itself creates an atmosphere of trust; thus, users can submit their responses based on their genuine feelings about the questions posed on the survey. Blockchain's attributes then safeguard the data submitted. With blockchain's immutability, data submitted on any platform is stored in its original form with little to no chance of interference by an outside source. Data submitted is therefore safeguarded through the transfer process from the participant to the surveyor.

**Safeguarding Participant Data:** Blockchain is a distributed ledger which contains data from its users across a peer to peer network that is continuously reconciled. The nature of blockchain makes it harder for fraudsters to instigate any unethical practices. The practices can easily be traced to the distributed ledger. The data stored therein is immutable. The immutability of blockchain also poses a challenge to survey fraudsters. Surveys carried out through blockchain platforms are extremely hard to replicate. The record keeping nature of blockchain will make it easier for fraudsters to be identified on these platforms.

**User Benefits:** Incentives encourage more people to take surveys. It is also highly likely that participants will even recommend the survey to their peers. The rewards offered by blockchain powered surveys are usually coins or tokens that do not have any immediate monetary value. They either have to be traded or used within the survey platform. The method employed not only ensures increased accuracy in data provided but also benefits the respondents through the data they give.

For participants, the cryptocurrency-based rewards offered by blockchain powered surveys also act as a form of investments. The introduction of participants into the cryptocurrency exchange space may prove more valuable than instant survey rewards offered by centrally powered surveys.



**Confident Responses:** Blockchain’s reputation as a secure foundation provides a confidence boost in the responses given. This is crucial for both the surveyor and the respondents. The participants are likely to respond confidently and truthfully with the knowledge that their identity and responses are carefully safeguarded by blockchain technology.

## **VII. Conclusion**

Economic theory and the developments in capital markets show clearly the value and merit of the proposed benchmark. Expected inflation rate and expected growth of real output are essential for of proper credit decisions. Moreover, the benchmark is consistent with the principles of Islamic finance, which require the tight integration between finance and the real economy. The adoption of the benchmark might take some time, but its contribution to the economies of OIC Member Countries, and the global economy at large, is likely to be overall substantial.



## Studies on Expectation Surveys

- Bates, J., and C. Granger (1969): The Combination of Forecasts, *Operations Research Quarterly*, 20, 451-468.
- Bauer, M and E McCarthy (2015): "Can we rely on market-based inflation forecasts?", *FRBSF Economic Letter*, no 2015-30.
- Binder, C (2015): "Whose expectations augment the Phillips curve?", *Economics Letters*, vol 136, pp 35–8.
- Coibion, O and Y Gorodnichenko (2015): "Is the Phillips curve alive and well after all? Inflation expectations and the missing disinflation", *American Economic Journal: Macroeconomics*, vol 7, no 1, pp 197–232.
- De Pooter, M, P Robitaille, I Walker and M Zdinak (2014): "Are long-term inflation expectations well anchored in Brazil, Chile and Mexico?", *International Journal of Central Banking*, June, pp 337–400.
- Faust, J, and J Wright, (2013): "Inflation forecasting", *Handbook of Forecasting*, no 2:A,
- Filip Novotný and Marie Raková (both Czech National Bank), "Assessment of Consensus Forecasts Accuracy: The Czech National Bank Perspective", *Working Paper Series 14*, December 2010.
- Gürkaynak, R, A Levin and E Swanson (2010): "Does inflation targeting anchor long-run inflation expectations? Evidence from the U.S., UK, and Sweden", *Journal of the European Economic Association*, vol 8, no 6, pp 1208–42.
- Hördahl, P (2009): "Disentangling the drivers of recent shifts in break-even inflation rates", *BIS Quarterly Review*, March, pp 10–11.
- Kearns Jonathan, *Global inflation forecasts*, BIS Working Papers, No 582, 20 September 2016
- Kumar, S, S Afrouzi, O Coibion and Y Gorodnichenko (2015): "Inflation targeting does not anchor inflation expectations: evidence from firms in New Zealand", *Brookings Papers on Economic Activity*, forthcoming.
- Marten Blix, Joachim Wadefjord, Ulrika Wienecke and Martin Adahl (Swedish Central Bank), "How Good is the Forecasting Performance of Major Institutions?", *Economic Review of the Swedish Central Bank*, Autumn 2001.
- Moreno, R and A Villar (2010): "Inflation expectations, persistence and monetary policy", *BIS Papers*, no 49, pp 77–92, January.
- Robert C. Jones, "Making Better Investment Decisions", *The Journal of Portfolio Management*, Volume 40 No 2, P.128- 143, Winter 2014.
- Roy Batchelor (City University Business School), "The IMF and OECD versus Consensus Forecasts", August 2000 (see above radar graphs). *Applied Economics*, 33(2), p.225-235; [Peer Reviewed].
- Sal Miah, *Analysis of Blockchain on Surveys and Data Collection, Part 1*; 17 April 2019  
<https://medium.com/hackernoon/analysis-of-blockchain-on-surveys-and-data-collection-part-1-3795cb4ff1b4>
- Sal Miah, *Analysis of Blockchain on Surveys and Data Collection, Part 2*; 25 April 2019  
<https://medium.com/hackernoon/analysis-of-blockchain-on-surveys-and-data-collection-part-2-9e12a1b095cd>

Schuh, S (2001): "An evaluation of recent macroeconomic forecast errors", *New England Economic Review*, January–February, pp 35–56.

Scott J. Armstrong, "Combining Forecasts", Chapter 13, *Principles of Forecasting: A Handbook for Researchers and Practitioners*, The Wharton School, University of Pennsylvania, P.417- 439, 2001.

Sousa Ricardo and Yetman James, *Inflation expectations and monetary policy*, BIS Papers No 89, November 2016

Svensson, L (1997): "Inflation forecast targeting: implementing and monitoring inflation targets", *European Economic Review*, vol 41, no 6, pp 1111–46.